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JOURNAL OF EDUCATIONAL RESEARCH

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JOURNAL *of* EDUCATIONAL RESEARCH

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AN ADJUSTMENT SURVEY

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and
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THE traditional method in handling problems of personal adjustment has been to wait until a bad situation forced itself on one's attention and then to begin casting about for a remedy. Children were brought up according to tradition. The doctor was consulted only when they were sick, and they were disciplined only when naughty. Much of the work in school, notably in English, has been devoted to the correction of bad habits previously acquired.

With the advent of the scientific method in educational procedure, techniques have been developed whereby approaching crises may be forestalled by early diagnosis. Foresight is better than hindsight and in the long run is more economical. The survey method has been used extensively in the achievement side of school work and teachers are now able to take frequent stock of educational progress and make needed readjustments.

The time is now ripe for applying the same survey methods to the wider problems of social and personal adjustment. Psychology has provided the necessary techniques. This paper describes the results of such a survey in several high schools near New York City.

Two instruments were used in this survey. One, a *questionnaire*, addressed to each pupil inquired concerning his satisfaction with various phases of home and school life. This questionnaire may be considered as a measure of *individual* adjustment—the degree to which a pupil is happy, contented, and satisfied with his life as it is being lived. The other instrument, a form of *rating* sheet, asked each pupil to designate other pupils in the school who best fitted various descriptions symptomatic of maladjustment. The frequency of these designations for any pupil

becomes a measure of social maladjustment—the degree to which a pupil impresses others in the school as acting queer or as being objectionable. The questionnaire studies the individual's *own satisfaction* with his life at school and at home; the rating device studies his *reputation* for *social* adjustment among his school fellows.

ADJUSTMENT QUESTIONNAIRE

The questionnaire contains 175 items divided into 7 sections as follows:

	No. of Items
Adjustment in Relation to the Curriculum	24
Adjustment in Relation to the Social Life of the School	23
Adjustment in Relation to the Administration	14
Adjustment in Relation to the Teachers	33
Adjustment in Relation to the Other Pupils	33
Adjustment in Relation to Home and Family	36
Adjustment in Relation to Personal Affairs	12
	175

In giving the questionnaire we were careful to see that neither the principal nor any of the teachers were present, and we promised the pupils that the results would be kept confidential so that they might feel entirely at liberty to express themselves truthfully. The questionnaire requires about 35 minutes time from each student.

All of the items are questions requiring yes or no for an answer. Often a pupil showed an especially strong feeling with regard to some item by making a heavy black mark with his pencil. There was some evidence that a neutral answer was needed for those who found it difficult to make a decision in either direction, but such a neutral answer was not included because it would have been an invitation for some to avoid committing themselves. Also, the consideration of ease of scoring led us to adopt the simple yes-no answer form.

Care was taken that about one-half the questions should suggest the positive side of the issue. It was believed that a mood of general dislike might be created which would unduly influence the answers if all the questions suggested that things were not going right in the pupils' life. The questions were also worded and arranged so that they were in a chance order according to the key.

The scoring key was constructed by having several persons give their judgment as to whether yes or no for each item represented the direction toward better adjustment. These decisions were fairly obvious and there was general agreement concerning the scoring key. The score

represented the total number of items answered in agreement with the scoring key.

In the directions the pupils were requested to answer every item. Experience has shown that if pupils omit items on a questionnaire of this type the results are difficult to interpret. Some items were omitted, however, and in others the responses were underlined, but these, of course, received no credit. Items which are not answered or those in which both *yes* and *no* are underlined are believed to have special significance.

The distribution of scores in five high schools with means and standard deviations are given in Table I:

TABLE I

DISTRIBUTION OF SCORES ON ADJUSTMENT QUESTIONNAIRE IN FIVE HIGH SCHOOLS

Scores	F1	F2	F3	F4	F5	F Total
175-179						
170-174						
165-169				1		1
160-164	2	1				3
155-159	7	8				15
150-154	13	15			1	29
145-149	24	4	3	1	2	34
140-144	27	19	1		4	51
135-139	15	11	3		1	30
130-134	12	11	13	2	4	42
125-129	25	12	6	1	5	49
120-124	11	4	5	2	6	28
115-119	6	5	7	9	4	31
110-114	10	5	3	3	5	26
105-109	3	5		3	1	12
100-104	3	3	4	1		11
95-99	2	2	2	3	1	10
90-94		1			2	3
85-89		2	2		1	5
80-84	1	2			2	5
75-79		1	1	3	1	6
70-74				3		3
65-69	1					1
60-64						
N	162	111	50	32	40	395
M	131.5	129.4	120.3	107.3	117.25	128.43
	15.7	192	159	21.6	18.7	19.15

The average score and standard deviation on separate parts of the test for 234 pupils is as follows:

Section		M	Percent of possible total score	S. D.
I	Curriculum	16.6	69.4%	3.8
II	Social Life	17.8	77.4%	3.1
III	Administration	10.2	72.9%	2.9
IV	Teachers	22.0	66.7%	6.3
V	Pupils	24.3	73.7%	4.3
VI	Home	29.4	81.6%	4.1
VII	Personal	7.8	65.0%	2.1

One will note that most of the fault was found with teachers, curriculum, and in connection with general personal problems. Least fault was found with home, social life of the school, and other pupils. The significance of these differences is commented on later.

The reliability of the questionnaire, determined by correlating random halves of it, was found to be .81 and .73 on two populations of 164 and 50, which was raised to .90 and .84 by application of the Spearman-Brown formula. This shows a certain consistency of response, indicating that the score is not a mere chance fluctuation, but represents a real tendency toward satisfaction or dissatisfaction.

The reliability of the separate parts determined in one school together with the correlation of each part with the total score is given in Table II:

TABLE II

Part	$\sqrt{r_{\frac{1}{2}\,\frac{1}{2}}}$	$\sqrt{r_{1_1}}$	$\sqrt{\text{section-total questionnaire}}$
I	.59	.74	.69
II	.47	.64	.65
III	.40	.58	.55
IV	.72	.83	.77
V	.55	.71	.71
VI	.45	.62	.65
VII	.31	.48	.60
Total	.81	.90	

The correlations of each part with the total are a resultant of actual relationship and the reliability of the separate sections.

The validity of the questionnaire must rest largely on the obviousness of its method. Direct questions are asked about a pupil's likes or beliefs concerning various phases of his school or home life. The answers are direct responses indicating satisfaction or dissatisfaction. Everything seems to depend on the truthfulness of the answers. Concerning this we have no direct proof but considerable circumstantial evidence. In the first place, the pupils answered the questionnaire seriously. In the second place, interviews with a number of pupils making low scores corroborated the difficulties which seem to exist from the questionnaire answers. In the third place, a perusal of the papers showed plainly that pupils did not hesitate to express their dissatisfaction in a large number of cases. That the one section concerning adjustment to teachers, about which there was the most doubt concerning the truthfulness of the answers, showed the lowest percentage of favorable responses, is another indication that pupils did not hesitate to express themselves even where it might not be to their best interest to do so.

An analysis of each item was made by tabulating the responses on each item made by the 50 papers making the highest total scores and by the 50 papers making the lowest total scores. A comparison of these two groups shows the items which best help to differentiate pupils having good adjustment from pupils having poor adjustment. The items which are most significant are as follows:

Are you given a chance to tell or show what you know in your classes?
Do you think there should be more try-out or optional classes?
Are you required to take subjects that you dislike?
Would you select another teacher in any of your subjects if you were permitted to?
Do your teachers require too much homework?
Do your teachers make the assignments too long?
Do you like examinations in school?
Do your teachers usually understand your difficulties?
Do all of your teachers treat you as a friend?
Do any of your teachers have a wrong opinion about you?
Are you ever punished for things you do not do?
Do any of your teachers mark examinations too severely?
Do you feel that you are making quite a success of the things that you do?
Do you often fail in the subjects that you dislike?
Do all of your teachers make the assignment clear?
Do your teachers praise you when you hand in good work?
Do you think that any of your teachers are too strict?
Are you doing as much or as well in school as your parents expect you to do?
Do you think your work this year is rather monotonous?

Practically all of these items which correlate highest with the total have to do with a pupil's success in school. Other items concerning a pupil's friends, his adjustments at home, and his participation in the social life of the school do not give such a clear cut distinction between those making low and high scores. One obvious reason for this may be that the questionnaire is overweighted with items about success so that naturally items on this theme correlate most highly with the total. It is the authors' belief, however, that those factors of being successful and being appreciated by others are really the most important factors in determining the quality of adolescent adjustments.

By taking an average of these validity differences for each section one gets a figure which represents the correlation of each section with the total and may be thought of as representing the significance of that section.

Section		Av. diff. between 50 high scoring and 50 low scoring papers
I	Curricular	13.7
II	Social life of school	10.8
III	Administration	12.7
IV	Teachers	16.3
V	Other Pupils	13.7
VI	Home	10.7
VII	Personal	17.7

It may seem unusual that adjustment to home life should be the section concerning which the pupils express the least dissatisfaction. In the literature on personal adjustments the blame for most of an adolescent's difficulties is attributed to the home. Our own observation of cases making low scores indicates that the home life and parental attitudes are responsible for much of the dissatisfaction in school. The explanation of the discrepancy is that pupils, having grown up in the home, are accustomed to it. Being acquainted with only one home—their own—they are not aware of their difficulties at home as compared with the difficulties of others. People tend to feel dissatisfaction more in new than in old situations, and more in situations where they can compare their status with others than where such comparisons are not possible. Hence they are most keenly aware of any difficulties that they experience in school.[1]

The correlation with scores on an intelligence test is .38, .10, and .42 in three instances and with IQ derived from the first two of these tests .26 and .08.

In two schools correlations of .30 and .53 were found between marks given during the first term of the present school year and the questionnaire.

Questionnaires of this type should find an important place in the work of the school. They may be used in spotting individual pupils who for some reason or other are having difficulty in making personal adjustments. If these pupils are studied further and some action taken to make the school serve them better they may be prevented from dropping out of school early, or later more serious pathological states may be prevented or mitigated.

This questionnaire may also be used to measure general *school morale*. School A shows a general higher average of scores on the questionnaire that seem to correspond with what is known as the superior spirit on the part of student body and faculty in this school.

Finally this questionnaire with slight modifications in form may be used to study the efficiency of different teachers. Nothing is more important in the work of the school than that pupils learn to make satisfactory life adjustments. The teacher who is most successful in creating the feeling of success and satisfaction in her pupils is, other things

[1] It has also been suggested that the favorable replies concerning the home are due to the fact that homes now let children do about as they wish. The writer tends to discount this factor altogether. Differences of this kind are effective only when relative, that is when one home is stricter than another.

being equal, an efficient teacher. Modern educational theory teaches that effective learning takes place when pupils feel a pleasure and satisfaction in their work. It is conceivable that a teacher might mislead a class by undeserved praise thus giving them an unjustified feeling of success. Pupil adjustment as a measure of teacher efficiency would have to be checked up against pupil achievement. But good pupil adjustment is a necessary condition for good achievement.

IDENTIFICATION SHEET

The rating form used is patterned after the "Guess Who" test devised by Hartshorne and May, described in their *Studies in Service and Self-Control*. This ingenious and simple device consists of brief descriptions of individuals. These sheets are distributed to all the pupils in a class with the instructions to apply these descriptions to individuals in the school. They are asked to help locate these individuals when recognized by writing their names against the appropriate description.

We assembled for this scale 34 descriptions, each taken from the literature on mental hygiene as representing a manifestation of maladjustment.[2] These ranged all the way from symptoms of nervousness to various behaviors commonly said to indicate feelings of inferiority.

This rating device gave a very satisfactory distribution. At first thought, it might appear that some one or two pupils in the school would be overwhelmingly voted as possessing this or that characteristic. This was not so. As many as thirty or forty pupils were identified for most of the qualities, some pupils more frequently than others. This gave good distributions for all of the items in the list. It also developed that if a pupil was recognized as possessing one characteristic by other pupils he was also identified as possessing a number of the characteristics. There seems to be a correlation between possessing, to a marked degree, some *one* behavior pattern indicative of maladjustment and possessing a *number* of behavior patterns also indicative of maladjustment.

Three possible methods of scoring were tried: one, merely counting the total number of times a pupil was recognized by another pupil for any of the 34 items; two, the number of items on which he was identified; and three, the number of items on which he was identified by two or more pupils. The intercorrelations using these three methods were

[2] We are indebted to Mr. Randolph B. Smith for some of the items in this scale which were taken from a list prepared by him as suggestions for observation of possible personality difficulties and behavior patterns to be used in the University of Minnesota High School.

$r_{12} = .79$ $r_{13} = .82$ and $r_{23} = .85$. The correlations with the questionnaire using the three methods were $-.26$, $-.08$ and $-.13$. It was decided to use for a pupil's score the total number of times mentioned on all items since this was most easily obtainable, although the issue between the three scoring methods is not clearcut.

When scored in this way it was found that the distribution was decidedly J-shaped. There were a large number of pupils identified only once or twice by others as being outstanding in any of the 34 items. This led to the realization that the rating device as used contains descriptions only of characteristics of the maladjusted. We are now working on a similar list of characteristics of the adjusted which when applied should pull some pupils previously not identified out in the other direction finally giving a symmetrical distribution.

Two types of reliability were computed for this scale. One is the correlation between the ratings made by one-half of the students against the other half which is .78, raised to .88 by the Spearman-Brown formula. This gives a measure of the reliability of judgment. The other is the correlation against the score made by taking half the items on the scale against the other half which is equal to .63, raised to .77 by the Spearman-Brown formula. It is evident that the scale is not homogeneous in material in its present form. Further study should help isolate the two or three different kinds of maladjustment included in the items in this scale.

Each item on this rating scheme was correlated with the total score on the rating scheme. Each item was also correlated against the total score on the questionnaire. These latter correlations for the most part are negative because scores on the questionnaire represent adjustment whereas scores on the rating device represent maladjustment.

The following items show the highest correlations with the two instruments:

	r with total reputation	r with questionnaire
1. Who is always grimacing or twitching his face, neck or some part of his body?	.67	—.06
6. Who is always day-dreaming in class?	.35	—.45
7. Who never volunteers to recite in class and does not recite until called on?	.36	—.51
8. Who is always bullying or teasing someone younger or smaller than himself?	.70	—.16
9. Who is always pushing or shoving or tripping up other people?	.67	+.03
10. Who is always making fun of other people?	.72	—.20
11. Who is always trying to crack jokes and make others laugh in class?	.70	—.11
12. Who tries to act tough and hard-boiled?	.63	—.37
13. Who is always trying to get attention in class?	.73	—.10
17. Who is very restless in study and is always moving around, sharpening a pencil, asking someone where the lesson is, etc.?	.62	—.07

19. Who is always playing with something else during the lesson so that he does not know the place when called on?	.47	+.12
24. Who is the person who has no friends or only one friend and is always going off by himself?	.12	—.61
29. Who is always blaming other people for his failures?	.59	—.19
31. Who is always staying out of school for minor illnesses or complaints?	.04	—.64

The patterns shown by these correlations are most interesting. Those items which correlate most highly with the total reputation by others are the extrovert, aggressive items. A boy or girl is judged to be queer or maladjusted when he exhibits positive active symptoms of nervousness, or is disagreeable, obstreperous, and annoying to others. On the other hand, a pupil who says that he is dissatisfied and feels most inadequate is the lonely, day-dreaming individual who finds excuses for being sick, or for not having his work done. This suggests the possible conclusion that those who gather the reputation for being queer or maladjusted most easily are those who show extrovert tendencies, but that those who really feel most inadequate and unhappy are the introverts. These investigations make it quite clear that adjustment is not a simple, well-defined concept. There are two phases of adjustment—one, the social adjustment as evidenced by one's reputation; the other, personal adjustment as evidenced by one's expressions of satisfaction. The two are by no means identical. Both are important, but the problems of personal adjustment are the ones most easily overlooked.

SUMMARY

Two instruments have been developed for surveying the personality adjustments of high-school students. One, a questionnaire, is designed to measure an individual's satisfaction with school and home life; the other, a rating device filled out by the pupils, indicating an individual's reputation for characteristics commonly alleged to be symptomatic of maladjustment. A study of the separate items indicates that low scores on the questionnaire are most often made by the seclusive, introverted pupil who *feels* that he is not making a success of things he does and believes himself unappreciated. Those who have the reputation on the other hand for exhibiting those characteristics commonly spoken of as symptomatic of maladjustment are the boisterous, attention-getting, extroverted individuals.

The common practice is to wait until personality maladjustment becomes pronounced before it is recognized and before remedial measures are taken. The instruments described in this paper enable one to recog-

nize personality disorders when in incipient form and take steps to bring about mental health before the matter develops into a genuine pathological state. It is also believed that the questionnaire may be used as a measure of one aspect of a teacher's efficiency and of a school's morale.

DIRECTING ADMINISTRATIVE RESEARCH[1]

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"RESEARCH in educational administration seeks to discover, in the light of the purposes of education commonly acknowledged, the most efficient procedures in the organization, supervision, financing, and evaluation of the program of educational service. It results in the statement of principles or the description of procedures essential to the development of an efficient administration of schools.

"The research worker in this field employs the methods common to all fields of scientific inquiry..... He favors objective measures and is satisfied with nothing less than competent evidence."[2]

With this definition of administrative research, this paper discusses preparation for research, choosing a problem, outlining the problem, and causes of trouble and waste. The whole procedure is concreted by showing how school survey work may be utilized to train students in research methods on administrative problems.

PREPARATION FOR RESEARCH

The first step in training students for administrative research is to see that they have adequate preparation before they start an investigation. This preparation involves two phases, techniques, and a canvass of the student's abilities to see which techniques he can most likely use with profit.

Of the various methods used in administrative research, the statistical method is most important. No student should think of doing administrative research without at least an elementary course in statistics, preferably with illustrations and exercises chosen from school administration. A knowledge of statistical procedures is, however, of little importance compared with knowing when to use them, which are the simplest, or how to interpret them. The best procedure here is to have the student as early as possible study model statistical researches to discover the statistical methods used, why they were used, and how the author interpreted and applied the statistical results.

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[1] Paper read before Administrative Round Table of College Teachers of Education, Atlantic City, N. J., February 25, 1930.

[2] From the writer's "Educational Research," 1929, p. 1.

For learning about other research methods, the student can be s to reading books like those of Good,[3] Monroe,[4] Bixler,[5] or Crawford,[6] he can take a course in methods of research. Several institutions offe such a course, although there is considerable skepticism about it fro both faculty and students. In the writer's opinion, any student wit the native ability to learn to do administrative research, can learn re search methods, other than statistics, by reading closely some of th books mentioned, dissertations, and researches carefully chosen to sho the methods most useful in administrative investigations.

CHOOSING A PROBLEM

The choice of a research problem is frequently made by the student's major professor. Professors believing in regimented research are likely to have definite programs of administrative research laid out for years in advance. They know the unsolved problems or gaps. They are ready to give a student a problem and drive him through on it. Under such a professor the part of students may be simply:

> "Theirs not to make reply,
> Theirs not to reason why,
> Theirs but to do and die—"

as far as any further research on their part after they leave the professor.

But it is possible for even regimented research to be much more valuable for training the student than it often is. The professor may at least take pains to explain to students his program and how his problem relates to it. This plan is probably best adapted to the mediocre and poorer students. Many poorer students welcome it with relief. Yet they seldom ever acquire self-starters. If they later produce any real research, they have to be cranked each time by the professor.

A higher type of work comes from the professor who refuses to assign problems outright. Such an instructor will suggest a list of good problems, or will give a list containing both good and bad problems and ask the student to indicate his preference with reasons for his choice. The instructor may refer the student to long lists of researches and ask him

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[3] Good, C. V. *How to Do Research in Education*, (Baltimore: Warwick and York, Inc., 1928), 298 pp.

[4] Monroe, W. S., and Engelhart, M. D. "The Techniques of Educational Research," University of Illinois Bulletin, XXV, (January 10, 1928).

[5] Bixler, H. H. *Check Lists for Educational Research*, (New York: Bureau of Publications, Teachers College, Columbia University, 1928), 118 pp.

[6] Crawford, C. C. *The Technique of Research in Education*, (Los Angeles: University of Southern California, 1928), 320 pp.

to make a list of the unsolved problems observed. It must be conceded that those students choosing their own problems with little or no help, are the more capable ones.

The better ones may be encouraged to choose thier own problems. The mediocre and poorer ones may be given more help. But for both classes, as much freedom in choice as possible should be allowed.

OUTLINING THE PROBLEM

Once the choice of a problem is made, or even before it is actually made, the student should prepare an outline of what he proposes to do. The two important things here are to have this outline in a form so that it will not be a mere list of topics, and to have it defended before competent critics. The outline might contain such items as a statement of purpose, sources of data, proposed methods of securing data, techniques to be used in working up data, and probable values or applications of the findings. These should force the student to question the value of his research and to think through the main procedures in what he proposes to do.

The outline should be defended by the student before others. The student should do this with his major professor and before his regular seminar. Students may have little knowledge of the special field and less interest in it; a student may do better to get a group of his close classmates or those particularly interested in the problem for a special meeting; presentation before an informal group of interested persons, should afford an excellent opportunity for defense and its ensuing values. Students may gain much more from such a meeting than from several regular seminar periods.

CAUSES OF TROUBLE AND WASTE

All the work of making the research until the write-up, if the student is to be trained in methods of research for independent use later on, should be conducted on much the same plan as in choosing or outlining a problem. That is, the professor should stimulate, offer suggestions, and force the student to defend his procedure. It would seem that there are four common causes of trouble and waste:

1. *Students often get mired down in the bog of definition, or lost in the wilderness of objectives and criteria.* Now it is only common sense to define one's terms and have accurate knowledge of the standards one is employing in determining values. But few things will stop a promis-

ing research as quickly as for the worker to get the idea that everything must be accurately defined at the outset and that every criterion must be objective, whatever that may mean. The most successful administrative researches are those where the worker proceeded to set up and solve some worthwhile problem. His write-up involves clear definitions and clearly stated criteria applied so as to make his conclusions inevitable. But he could not have defined his terms exactly or stated his criteria precisely until the work was pretty well done. Probably the most outstanding dissertation in administration in a generation, if we judge it by its results, (Mort's "Measurement of Educational Need,") was of this nature.

2. *Students are apt to rush into a fool's paradise of clerical work under the notion that it is research.* Setting up a problem, organizing work, laying out a scheme of procedures and subjecting everything to keen criticism,—all these require hard and rigorous thinking. The student naturally tends to avoid this and to slip into the soothing routine of taking notes on reading, abstracting articles, looking up bibliographies, copying figures, tabulating data, running calculating machines, or assembling and mailing the sheets in a questionnaire. Until their use has been clearly thought through and justified, all these things are as deadly to productive research as opium to an aviator on duty. The professor of admininstration can help a student tremendously by forcing him to justify all clerical work of the kinds named before doing it. The professor can also try to provide all possible devices for minimizing the drudgery on mechanical phases so as to save time and energy for the higher thought activities. The department can provide computing machines and tabulating forms to prevent waste in figuring by hand and poor tabulation layouts. The writer's pamphlet on educational research[7] is kept up and printed every two years so that men in administration may no longer do the clerical work involved in running down bibliographies under the notion that they are doing research. He hopes that this will in time make it impossible for students in school administration to claim credit for research on compilations that a minor library clerical worker could do better. To prevent wasteful bibliographical work of a hack nature and to give students profitable training in bibliographical research on administrative problems, one member of the staff may

[7] Alexander, Carter. *Educational Research*, Second Edition, Revised. (New York: Bureau of Publications, Teachers College, Columbia University, 1929), 77 pp.

specialize in the literature of administration and sources of pertinent data, for the whole department.

3. *Students do not have efficient working schedules.* Many students need to lay out schedules so that they will have long periods of a day or two in which they can get the concentration and drive necessary for certain phases of researches. They can do the clerical bits in all sorts of odds and ends of time. But they cannot do much on the higher phases except in long working stretches. The professor can help the student to lay out a good work schedule and can also see that each student reports progress to him at least every two weeks or so. A regular schedule for this reporting helps wonderfully. At the same time there is a great value in a student's being able to get help from his professor at the psychological moment of greatest need. He should not, however, for the peace of mind of both, have many such moments a year outside his regular conference periods.

4. *Poor write-ups lead to sloppy thinking on the part of the student, and to great waste of the professor's time and energy.* The main thing here is to imbue the student with the idea that no research is really completed until it is so written up that it will get its message across to those interested. The way to do this is give the student to understand that he will be held to standards on the write-up. He can be referred to what the professor considers model reports of administrative research. Or he can be referred to the write-up sections of the books previously mentioned or to Ward G. Reeder's *How to Write a Thesis.* The writer personally gets the most help from W. S. Monroe's "Criteria for Judging or Planning a Report of Educational Research"[8] and occasionally re-reads them to insure better write-ups in his own work.

RESEARCH TRAINING IN SURVEYS

It will perhaps clear up procedures in training for administrative research to show the possibilities of surveys in this connection. When a school survey starts, the director usually appoints committees for the major phases, each directed by a staff specialist. Students may be asked to write down committee preferences so that each committee may have for members only those who really desire to work on it. The staff may encourage students to select different committees on different surveys

[8] Monroe, W. S., and Engelhart, M. D. "The Techniques of Educational Research," University of Illinois Bulletin, XXV, (January 10, 1928), pp. 57-61.

to enlarge their experience. Each man may be given experience in looking up financial data, running a calculating machine, going over accounts, typing, making graphs, looking up school law, writing up reports, and the like.

Each committee may make at least one trip of several days to the city surveyed, collecting data and modifying the original outline in the light of more accurate knowledge of local conditions. In this work each man is responsible for certain phases of the work. On returning to the institution, the committee may work up the data drafting an outline of the final report. This may then be written up in sections. The sectional reports may then be consolidated by the committee member best qualified to do this.

The survey committee gives to the whole class from time to time its set-up, difficulties, ways of solving difficulties, progress, and final report. The committee gets the benefit of the criticisms of other committees and sees how the same problem appears from different viewpoints. Each student in the survey class thus learns much about how to do administrative research, not only from his own committee, but from the other committees as well.

THE INFLUENCE OF CLASS SIZE UPON PUPIL ACCOMPLISHMENT IN HIGH-SCHOOL ALGEBRA

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II. The Results of an Investigation in Second-Semester High-School Algebra

THE present study, one unit of an investigation into the relationship between class-size and the resultant effect upon teaching efficiency, was initiated by a committee of the Secondary School Principals of the National Education Association at a meeting held in Oakland, California, October 18, 1928. Those responsible for the investigation in its gross aspects deemed it advisable that the effects of class-size on subject accomplishment be investigated with many rather than few school subjects, and that only one or two schools should investigate the class-size problem in connection with any one school subject. To Galileo High School, San Francisco, California, was allotted the study of class-size and its effects upon teaching efficiency in elementary algebra.[1]

It was decided that the effect of class-size upon teaching efficiency should be made in connection with second-semester algebra, rather than with more or less advanced classes in the subject, or with a wider range of accomplishment. Several considerations prompted this decision: Terman Group Test IQ ratings[2] were available for all the children in the second-semester algebra classes (an item of considerable moment when dealing with large numbers under the stress of end-semester conditions in a large city high school); it was thought, how wisely one cannot say, that measurement of accomplishment in algebra would be more facile and

[1] The author (M. B. J.) as director of the study at Galileo High School, is greatly indebted to Principal Joseph P. Nourse, and to Mr. F. W. Rockhold, Head of the Department of Mathematics, for suggestions relative to the study, and for coöperation without which the plans for the study could not have been administered. Much credit is due the teachers conducting the classes, both for their loyal coöperation and for the objectivity with which they conducted their work.

[2] These ratings were, for the most part, from tests given by classroom teachers in the various elementary schools from which the children came. The remainder of the tests were given by Mr. E. J. Irwin at Galileo High School. While ratings from tests all given at the same time and by the same person would have been considerably more reliable, limitations of time and of clerical assistance made such a procedure impossible.

accurate with those who had already had a semester of algebra at Galileo than with students just from the various elementary schools of the city who had had no high-school algebra—the background of algebraic experience is more nearly uniform with the former group. Consequently objective measurement of knowledge of algebra might reasonably be considered more accurate in the case of second semester students than in the case of those just beginning the study of algebra. Projecting the study into higher algebra classes would have meant dealing with smaller numbers, measurement of more complex mathematical processes, which was felt to necessitate a prohibitive amount of time for test construction,[3] and was rendered practically impossible by the conflict of elective courses in the higher classes. Once the personnel of the classes to be used in the experiment was determined, the programs of the students were fixed, so far as algebra and English were concerned, and the students had to shape their programs so that there were no conflicts with these subjects. It was felt that this would seriously have handicapped students in the more advanced courses. The study was delimited, therefore, to second-semester algebra classes, and was an attempt to determine the effects of class-size (large or small numbers of students) upon the effectiveness of instruction in algebra under actual conditions in a large city high school. The conditions affecting the study are treated in the following discussion.

In a previous discussion,[4] the authors criticized some of the earlier studies in this field on the ground that many factors which might influence the results of the studies have not been sufficiently under control. It is probable that the present study will meet with similar criticisms. The conditions under which this investigation was made precluded more adequate procedures at certain points. Despite these limitations, a definite attempt was made to control many factors not previously shown to be constant in experiments of this type: chronological age; sex; mental ability as measured by Terman Group Test IQ's; subject knowledge as measured by inventory tests known to possess an exceptionally high degree of accuracy; language handicaps due to differences in national origin; diurnal changes; course of study; procedures in administering

[3] As none of the available algebra tests were considered adequate, the measures of accomplishment used were devised expressly for the study (see p. 341).

[4] Jensen, Milton B., and Dortha W. "The Influence of Class-Size Upon Pupil Accomplishment in High-School Algebra: I. Summary of Literature and of Previous Investigations," XXI, (February 1930), pp. 120-137.

and scoring tests; and influence of teachers—these factors under the circumstances have been under very strict control. Other factors, such as size of classroom, class attendance, methods of study and amount of work done outside the classroom, while not controllable, have been considered by the authors and the possible seriousness of their influences has been noted. The paragraphs which follow are concerned with the discussion of the above mentioned factors.

One-hundred-eighty-five children (64 girls, 121 boys) for whom the required data were available, met all the conditions of the study. All of them had had one semester of elementary algebra at Galileo high school; none of them were repeating the subject; on the basis of teachers' judgments there were no serious handicaps due to language deficiencies or emotional strains;[5] and for all of them the following data were available: Terman Group Test IQ, date of birth and of testing with the above-mentioned test, and initial scores (obtained at the end of the first semester's work) on the Content Test in Elementary Algebra devised by the authors as a measurement of accomplishment in the classes used in the experiment (see p. 341).

In determining the personnel of the large and small classes it was decided that the most adequate method of allowing for possible sex influences on class procedure was to separate the boys and girls. It was also thought that better instructional conditions would be assured if the range of mental ability in each of the classes were made as narrow as possible. Since there were only 64 girls available for the study, homogeneous grouping could not be attempted with them; (they were divided into a large class of 47 and a small class of 17). The 112 boys, however, were divided into two groups: those having Terman Group Test IQ's above 102, and those having Terman Group Test IQ's below 103.[6] The

[5] Galileo High School draws students from practically every race and social group of San Francisco. Some of the children are newly arrived from other countries, with a mastery of English decidedly inadequate for satisfactory high-school work. The English and algebra teachers were asked to check those so handicapped. Those checked were excluded from the study.

[6] It might be argued that a more satisfactory dichotomization for a study in algebra would have been secured by using additional factors such as mastery of algebra, for instance. This is probably true. The manner in which these various factors should be weighted for more satisfactory dichotomizing was not known, and time limitations precluded the possibility of more extensive statistical treatment prior to the organization of the classes.

two resultant groups were divided into large and small classes,[7] as will be seen from Table I, which gives the vital data for the various classes as constituted at the beginning of the experiment. Wherever possible each child in a small group was paired with a child in the large class who was his peer in age, sex, IQ, age at which he was tested with the Terman Group Test, and mastery of elementary algebra. The data for these pairings are given in Table VIII.

TABLE I

MEANS, STANDARD DEVIATIONS, RANGES AND POPULATIONS FOR THE VARIOUS PAIRS OF CLASSES AS CONSTITUTED AT THE BEGINNING OF THE EXPERIMENTAL PERIOD

	Boys IQ Below 103		Boys IQ Above 102		Girls	
	Small Class	Large Class	Small Class	Large Class	Small Class	Large Class
Number of pupils	15	41	17	48	17	47
Mean TGT IQ	94.2	93.1	115.0	114.5	102.4	103.1
S. D. of TGT IQ	5.1	7.2	6.7	8.8	14.9	12.7
Range of TGT IQ	81–98	72–102	105–130	103–134	72–129	81–128
Mean C. A. at TGT (mos.)	175.4	175.9	163.1	163.7	172.1	169.8
S. D. of C. A. at TGT	9.4	9.3	9.3	7.8	8.2	8.3
Range of C. A. at TGT	167–200	159–198	151–180	149–180	156–191	156–194
Mean C. A., Jan. 1, 1929*	182.3	182.9	171.0	170.6	179.0	176.6
S. D. of C. A., Jan. 1, 1929	8.6	11.4	12.2	8.8	8.9	8.3
Range of C. A., Jan. 1, 1929	170–206	167–210	156–188	155–189	163–199	160–199
Mean Score Elem. Alg. Content Test, Form I**	15.6	15.1	27.5	26.8	20.8	18.1
S. D. of Scores on Alg. Test, Form I	10.4	9.2	18.3	11.9	15.8	12.0
Range of Scores on Alg. Test, Form I	5–39	1–42	5–59	4–69	3–64	0–56

* At the beginning of the experiment.
** Given December 10, 1928.

The teachers associated with the study were selected from the regular staff at Galileo High School, with a view to coöperation, sympathy, and ability to do the work from an objective rather than a personal or prejudicial viewpoint; the work was so arranged that each of the three teachers selected would have a small class and the large class with which it was to be compared: thus one teacher had a large class and a small

[7] The size of the large and small classes was determined empirically. In experimentation with class-size in high school it has been common to call classes with enrollments of less than 20 "small" classes, and those with enrollments of 40 or over "large" classes. The present study has followed this procedure. The personnel of each pair of large and small classes was such that class means, ranges, and variability were approximately equal on each of the items which have been mentioned; chronological age, age at time of testing with the Terman Group Test, Terman Group Test IQ, and initial score on the Content Test in Algebra.

class of girls; one had the boys with IQ ratings below 103, and the third had the boys with IQ ratings above 102.

The course of study was the same for both large and small classes, and the teachers were instructed to "teach as much algebra as possible." It was thought that best results would be obtained if the teachers were free to use their own methods and to adapt the work to their pupils. Thus, if a teacher found one type of instruction more effective with the large than with the small class, she was at liberty to use it.[8] All that the teachers were told was that the students' progress would be determined entirely by objective measures, and that the objective of the experiment was to see which class could achieve the greatest mastery of the subject. The students in the various classes were also aware of the purpose of the study, and the rivalry in some of them, at least, was very spirited at times. In general the students were kept acquainted with the progress they were making, though no instructions were given their teachers on this point.

In view of the fact that the exact, or even approximate influence of diurnal changes upon teaching efficiency has not been determined, it is imperative that they be under control in a study such as this. Weekly alternations of recitation periods between large and small classes was the method employed in the present investigation. This was made possible by keeping the algebra groups intact for English and by having the same English teacher conduct both a large and a small class.[9] Thus, for example, the small classes would have algebra at ten o'clock and English at eleven o'clock one week, while the large classes were having English at ten and algebra at eleven. Each week there was an interchange of meeting time between algebra and English, so that the classes met for algebra the same periods alternate weeks. The desirability of this procedure is more apparent in view of the frequent interruptions of certain class periods for assemblies, etc.

As has been previously stated, progress in the algebra classes was

[8] Some may contend that the classroom procedure should be identical in the large and small classes. The study was, however, concerned with an evaluation of what might be done with large and small classes. This viewpoint must be accepted if the practical side of the problem is to be adequately approached.

[9] This of course constitutes an experiment in the teaching efficiency resultant from large and small classes in English. Though this is not as well controlled as the comparisons in algebra, the results, as measured by teachers' marks, are given on p. 355.

measured by tests especially constructed for the purpose.[10] Each item on the tests was validated on the basis of personal judgments, and by the percentages of "passes" at succeeding levels.[11] That the tests are possessed of a degree of accuracy sufficient for individual diagnosis is shown by the product-moment correlations between the two forms for succeeding semester ranges. These were: for the first-semester range of elementary algebra, $r = .96$ $(N = 62)$; for a range of the first two semesters, $r = .97$ $(N = 112)$; and for a range of the first three semesters, $r = .97$ $(N = 164)$. The tests are strictly objective and were devised expressly to measure achievement in the course of study as outlined for the high schools of San Francisco.

The testing program involved measuring with Form I at the beginning of the experiment (this was actually done just before the close of the preceding semester), testing with Form II at the middle of the experiment, and the administration of Form I at the close of the experiment. The tests were given under the personal direction of the authors December 10, 1928, March 18, 1929, and May 28, 1929. Students absent on these days were given the tests immediately upon returning to school.

Just what the influence of the size of classrooms was upon the teaching results in the present study, we have no adequate method of determining. The size of classrooms in our modern high schools has been determined without adequate information as to the most economical dimensions, and very often has been dictated by a desire to build rooms so small that classes could not well exceed certain desired standards. It is unfortunate that the rooms in the Galileo High School are virtually all of the same size. This precluded securing rooms large enough for all the large classes conducted in the experiment. Where students are crowded into insufficient space there is a consequent uneasiness, resulting in poor discipline or excessive demands upon the teacher as a disciplinarian, either of which results in decreased teaching efficiency. It is the opinion of the authors that this factor made teaching more difficult in the large classes. Unfortunately we cannot allow for such influences. The sizes of the various rooms used is given in Table II, together with the maximum number of pupils actually occupying them, and the number it seems desirable should occupy them at any one time. Our conclusions as to

[10] Jensen, Milton B. Content Test in Elementary Algebra.

[11] See the *Manual of Directions* for the Content Test.

the number which should be permitted are based upon judgments from the following sources: Strayer and Engelhardt allow a minimum of 15 square feet per pupil in the elementary grades;[12] Almack and Bursch, from analysis of 50 school surveys, conclude that 16.4 square feet is the desired floor space per pupil;[13] and Ayres, Williams, and Wood allow 19.2 square feet per pupil of floor space as a minimum in elementary schools.[14] From these we might reasonably conclude that high-school pupils should have a minimum floor space of about 20 square feet.

TABLE II

COMPARISON OF FLOOR SPACE IN CLASSROOMS USED IN THIS STUDY WITH THEORETICAL STANDARDS

Teacher	Algebra Rooms	Sq. Ft. of Floor Space	Actual Max. No. of Pupils	Theor. Max.	Excess of Practice over standard
A	(Boys, IQ below 103)	724	41	36	5
B	(Boys, IQ above 102)	575	48	29	18
C	(Girls)	575	47	29	17
	English Rooms				
D	(Boys, IQ below 103)	550	41	27	14
E	(Boys, IQ above 102)	575	48	29	18
F	(Girls)	600	47	30	17

We cannot, of course, determine the effects of such crowding upon the efficiency of teaching. It may be repeated here that San Francisco's situation with respect to size of classrooms is not uncommon in large city high schools.[15] Consequently this study may be said to have a more general application than if the physical conditions under which it was conducted were more ideal.

Achievement in the various classes was measured by means of the Content Test in Algebra and by teachers' marks for two periods of time: January 7, 1929, to March 18, 1929, and for a longer period including the first—January 7, 1929, to May 28, 1929. The product-moment correlations between the teachers' grades in the algebra classes and scores on the algebra tests are given in Table III. The correlations are given for

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[12] Strayer, G. D., and Engelhardt, N. L. *Standards for Elementary School Buildings.* (New York: Teachers College, Columbia University, 1923), p. 31.

[13] Almack, John C., and Bursch, James F. *The Administration of Consolidated and Village Schools.* (Boston: Houghton Mifflin Company, 1925), pp. 110-112.

[14] Ayres, M., Williams, Jesse F., and Wood, Thomas D. *Healthful Schools.* (Boston: Houghton Mifflin Company, 1918), pp. 31-35.

[15] According to a bulletin issued from the office of the superintendent of schools under date of April 23, 1929, there were in the senior high schools of San Francisco 385 classes with enrollments of 40 or over, 54 of which were in Galileo.

the large and small classes separately as well as for them combined, for each teacher, both for the mid-semester (March 18) and for the end-semester (May 28) measurements, also for the grades of all three teachers.

TABLE III

CORRELATIONS BETWEEN TEACHERS' MARKS AND SCORES ON THE CONTENT TEST IN ALGEBRA

	Teacher A (Boys, IQ below 103)	Teacher B (Boys, IQ above 102)	Teacher C Girls	All teachers (Boys and Girls)
Small Class				
Mid-semester	$^{+13}.91$	$^{17}.75$	$^{17}.83$	$^{46}.73$
End-semester	$^{10}.46$	$^{16}.98$	$^{17}.73$	$^{43}.67$
Large Class				
Mid-semester	$^{40}.54$	$^{47}.92$	$^{45}.73$	$^{133}.71$
End-semester	$^{40}.63$	$^{46}.91$	$^{43}.64$	$^{129}.66$
Large and small classes combined				
Mid-semester	$^{53}.70$	$^{64}.88$	$^{62}.73$	$^{179}.71$
End-semester	$^{50}.61$	$^{62}.92$	$^{60}.72$	$^{172}.76$

* The small figures above and to the left of each correlation refer to the populations involved.

Means, standard deviations and ranges for each of the classes on all of the measurements available at the beginning of the experiment were given in Table I. Of the 185 students enrolled at the beginning of the experimental period, 180 remained at the mid-semester testing, and 172 at the end of the semester. Six of the students who left school before the end of the semester were from the group of boys with IQ's below 103[16] (five from the small, and one from the large class); three were from the groups of boys with IQ's above 102 (one from the small and two from the large class); and four were girls (all from the large class).

When one of a pair left school, the remaining student of that pair was, if possible, re-paired with a student in the other class who was not previously paired. If the remaining student of the pair was in a small class, re-pairing was usually possible. Comparisons in Table VII are made only between students who remained in school to the close of the experimental period.

In comparing the progress of the large and small classes as units, gains have been computed for the classes as constituted at the time when the comparisons were made, exclusive of the influence of those who left

[16] But for the limited number of cases involved, one might conclude that small classes tend to eliminate dull children from school more rapidly than do large classes. It may be that failure, being more readily and more frequently detected in small classes, discourages the dull while it acts as an incentive to the bright child. This would be in keeping with the findings of Dr. Ellen B. Sullivan (reported in her unpublished Ph.D. dissertation, Stanford University), that commendation and a feeling of success are more essential to accomplishment among dull than bright children.

school before the end of the period under consideration. Thus, in the case of the small class of boys with IQ's below 103, all data for the 14 remaining at the mid-semester testing are for these 14 only—the one who left before March 18, 1929, was not counted as a member of the group; similar procedure was followed with the ten pupils remaining in this class at the end of the semester.

Comparisons of the progress of the various groups are given, for the first half of the semester in Table IV, and for the full semester period in Table V. Means, standard deviations of these means, populations, differences between the means of the large and small classes divided by the standard deviations of these differences (a minus indicates that the mean of the large class exceeded that of the small class, and a plus the opposite) are given for all the data available. *C. A., 1-1-29,* refers to chronological age as of January 1, 1929; *C. A. at TGT* refers to the chronological age at time of testing with the Terman Group Test; *TGT IQ* refers to IQ on the Terman Group Test; *Attended, First Half,*

TABLE IV

COMPARISONS OF THE LARGE AND SMALL CLASSES AT THE END OF THE FIRST HALF OF THE EXPERIMENTAL PERIOD

	SMALL CLASS			LARGE CLASS			$\frac{d}{\sigma d}$
	N	Mean	σM	N	Mean	σM	
TEACHER A (Boys, IQ below 103)	14			40			
C. A., 1-1-29 (mos.)		182.0	2.5		183.1	1.8	— .29
C. A. at TGT (mos.)		176.4	2.4		176.9	1.5	— .18
TGT IQ		94.2	1.4		92.9	1.1	+ .74
Attended, First Half		37.2	1.7		41.4	.5	—2.37
Alg., F.I., 12-10-28		15.8	2.9		15.1	1.5	+ .21
Alg., F.II, 3-18-29		28.8	3.1		30.8	1.9	— .55
Teacher's Marks		2.2	.7		3.9	.3	—2.20
TEACHER B (Boys, IQ above 102)	17			47			
C. A., 1-1-29 (mos.)		171.0	3.0		170.5	1.3	+ .15
C. A. at TGT (mos.)		163.1	2.3		163.6	1.1	— .20
TGT IQ		115.0	1.6		114.5	1.3	+ .24
Attended, First Half		46.4	1.1		46.6	.5	— .17
Alg., F.I, 12-10-28		27.5	4.4		27.0	1.8	+ .11
Alg., F.II, 3-18-29		52.1	4.1		42.8	2.1	+2.01
Teacher's Marks		7.8	.7		6.7	.4	+1.39
TEACHER C (Girls)	17			45			
C. A., 1-1-29 (mos.)		179.0	2.1		176.5	1.2	+1.01
C. A. at TGT (mos.)		172.1	2.0		169.6	1.3	+1.06
TGT IQ		102.4	3.6		103.4	1.9	— .27
Attended, First Half		47.5	.4		46.9	.4	+1.18
Alg., F.I, 12-10-28		20.8	3.8		17.7	1.8	+ .73
Alg., F.II, 3-18-29		29.5	3.7		29.6	2.1	— .02
Teacher's Marks		7.0	.8		5.7	.5	+1.26

means days in class from January 7, 1929, to March 18, 1929; *Attended, Semester*, means days in class from January 7, 1929, to May 28, 1929; *Alg.* refers to score on the Content Tests in Elementary Algebra, the date referring to the date on which it was administered, F.I to Form I and F. II to Form II; *Teachers' Marks* are for the first half (January 7, 1929, to March 18, 1929), and for the entire semester, as noted, the marks being expressed on an eleven point scale as follows: F, O; D—, 1; D, 2; D+, 3; C—, 4; C, 5; C+, 6; B—, 7; B, 8; B+, 9; A—, 10; A, 11. These same headings are used in Table VII.

TABLE V

COMPARISONS OF THE LARGE AND SMALL CLASSES AT THE END OF THE EXPERIMENTAL PERIOD

	SMALL CLASS			LARGE CLASS			$\frac{d}{\sigma d}$
	N	Mean	σM	N	Mean	σM	
TEACHER A (Boys, IQ below 103)	10			40			
C. A., 1-1-29 (mos.)		180.0	2.0		183.1	1.8	—1.11
C. A. at TGT (mos.)		173.6	1.9		176.9	1.5	—1.39
TGT IQ		94.2	.6		92.9	1.1	+ .87
Attended, semester		67.9	2.9		69.9	.7	— .67
Alg., F.I, 12-10-28		17.4	3.3		15.1	1.5	+ .64
Alg., F.I, 5-28-29		45.5	3.3		43.3	2.6	+ .52
Teacher's Marks		3.6	.8		3.8	.4	— .02
TEACHER B (Boys, IQ above 102)	16			46			
C. A., 1-1-29 (mos.)		171.2	3.1		171.1	1.3	.00
C. A. at TGT (mos.)		163.2	2.0		163.9	1.1	— .03
TGT IQ		115.2	1.7		114.7	1.3	+ .02
Attended, semester		86.6	.8		82.2	.8	+4.00
Alg., F.I, 12-10-28		25.8	4.4		27.2	1.8	— .30
Alg., F.I, 5-28-29		65.7	4.8		57.1	2.6	+1.53
Teacher's Marks		7.8	.6		7.2	.4	+ .86
TEACHER C (Girls)	17			43			
C. A., 1-1-29 (mos.)		179.0	2.1		176.7	1.3	+ .93
C. A. at TGT (mos.)		172.1	2.0		169.7	1.3	+1.02
TGT IQ		102.4	3.6		103.0	1.9	— .15
Attended, semester		90.6	.8		89.7	.5	—3.00
Alg., F.I, 12-10-28		20.8	3.8		17.9	1.8	+ .69
Alg., F.I, 5-28-29		37.4	4.7		39.9	2.8	— .45
Teacher's Marks		6.5	.7		5.0	.5	+1.87

The drawing of definite conclusions from Tables IV and V is rendered hazardous by the very limited number of comparisons possible—three, in fact. Teachers' marks were rather uniformly higher for the small than for the large classes at the end of the semester, though the boys with IQ's below 103 tended to receive better grades in the large class.

possibly to some extent because of more faithful attendance,[17] although the large class actually made a higher average score on the algebra test at the mid-semester testing. The most consistent differences are noted with the small class of "bright" boys (IQ above 102), who made better scores on the algebra tests and received better marks, both at the mid- and end-semester testings than did the large class of "bright" boys. They attended class more regularly the second half of the semester than did the boys in the large class though this was not the case the first half of the semester. Gains due to instruction in large and small classes are

TABLE VI

SIGNIFICANCE* OF MEAN GAINS FOR LARGE AND SMALL CLASSES

	M_2-M_1	$\sigma_{M_2-M_1}$	$\frac{M_2-M_1}{\sigma_{M_2-M_1}}$	M_3-M_1	$\sigma_{M_3-M_1}$	$\frac{M_3-M_1}{\sigma_{M_3-M_1}}$
TEACHER A (Boys, IQ below 103)						
Small Class	13.0	2.39	5.44	28.1	3.56	7.90
Large Class	15.7	2.01	7.82	28.2	2.94	9.60
TEACHER B (Boys, IQ above 102)						
Small Class	24.6	2.94	8.35	39.9	4.02	9.95
Large Class	15.8	1.26	12.33	26.9	.99	27.20
TEACHER C (Girls)						
Small Class	8.7	1.58	5.50	16.6	2.47	6.73
Large Class	11.9	1.63	7.25	22.0	1.78	12.33

* The standard deviation of the differences was obtained by the formula, $\sigma_d = \sqrt{\sigma_1^2 + \sigma_2^2 - 2\sigma_1\sigma_2 r_{12}}$ (Kelley, Truman L. *Statistical Method*, Macmillan Company, 1924. Formula 139, p. 182.) Where the measures are independent, as in Tables IV and V, the term $2\sigma_1\sigma_2 r_{12}$ becomes zero, leaving Formula 140 of the same reference. In evaluating gains, as in Table VI, the scores are, of course, correlated. The product-moment correlations between test scores at each of the three testings were found for each of the classes, and are given below. r_{12} is the correlation between algebra scores at the beginning and middle of the semester; r_{13} refers to the correlation between algebra scores at the beginning and end of the semester. The small figures above and to the left of the correlations give the populations.

	Mid-semester r_{12}	End-semester r_{13}
TEACHER A (Boys, IQ below 103)		
Small Class	$^{34}.68$	$^{30}.42$
Large Class	$^{40}.28$	$^{40}.00$
TEACHER B (Boys, IQ above 102)		
Small Class	$^{37}.76$	$^{36}.62$
Large Class	$^{47}.80$	$^{46}.97$
TEACHER C (Girls)		
Small Class	$^{39}.91$	$^{39}.85$
Large Class	$^{48}.78$	$^{48}.76$

[17] It is rather doubtful whether attendance differences have had any appreciable influence upon the accomplishment of these children. With the 80 children paired as has been explained, the product-moment correlations between days attended and gains as measured by the Content Test in Algebra were, for the first half of the semester, +.07, and for the entire semester period, —.15.

more adequately determined from the pairings as given in Table VI
It may be noted here that group gains on the algebra tests, though oft
less numerically, are uniformly more significant for the large classes, d
to increased reliability incident to larger numbers. This will be seen fr
Table VI, where the increases in tests scores, standard deviations of the
increases, and the quotients of the two with the gains as numerators, a
given. M_1 refers to the class means on the algebra test December 1
1928; M_2 to class means March 18, 1929, and M_3 to class means Ma
28, 1929. Table VI is indicative of the economy, from an administrati
viewpoint, of teaching large rather than small groups. It cannot, o
course, solve the problem as affecting the welfare of the studen
involved.[18]

Complete data for the paired pupils are given in Table VII. As ha
been stated, an attempt was made to pair each of the students in the sma
classes with a student of the same sex in the corresponding large clas
who was his peer in chronological age; chronological age at time o
testing with the Terman Group Test; Terman Group Test IQ; an
score on Form I of the Content Tests in Elementary Algebra. It wa
also intended that the means, ranges and standard deviations of thes
measures be the same, or as nearly the same as possible, in the classe
to which the two members of a pair were assigned for instruction—on
to a large class, the other to a small class. The items in the caption o
Table VII have already been explained in connection with Table IV
The Roman numerals in the stub refer to the various pairs, *S* indicatin
the child assigned to a small class, and *L* to the one of the same pai
assigned to a large class. Teacher A had the boys with IQ's below 10
Teacher B the boys with IQ's above 102, and Teacher C had the girls
The means and standard deviations of the means[19] are given immediately
following the data for the Nth (last) pair assigned to each teacher
followed by the standard deviation of the difference between the means
Means, standard deviations of the means, and standard deviations o
the differences between the means, for both small classes of boys com-
bined, and for both large classes of boys combined, and for combinations
of all the small classes taken as a unit, and of all the large classes taken

[18] Though it is unquestionably more economical, judged in per student costs for instruction, to conduct very large classes, such a procedure would not be justified, under our present economic conditions, if it seriously handicapped individual children.

[19] The standard deviation of the mean was obtained by the formula, $\sigma_M = \frac{\sigma}{\sqrt{N}}$ (Kelley, Truman L. *Statistical Method*, Macmillan Co., 1924. Formula 29, p. 83.)

s a unit, are given at the foot of the table. Thus, it will be noted, omparisons are possible between ten groups of children, five of which eceived instruction in second semester elementary algebra in small lasses (from ten to 17 in enrollment), the remaining five, each child of hich was paired with a child in the small class, receiving instruction n a large class (40 to 48 in enrollment). These comparisons may be ndicated as follows:

Group No.	In Small Class		Group No.	In Large Class
I.	10 boys, IQ below 103	*compared with*	VI.	10 boys, IQ below 103.
II.	15 boys, IQ above 102	*compared with*	VII.	15 boys, IQ above 102.
III.	15 girls	*compared with*	VIII.	15 girls.
IV.	25 boys (I. and II. combined)	*compared with*	IX.	25 boys (I. and II. combined).
V.	40 children (I., II., and III. combined)	*compared with*	X.	40 children (I., II., and III. combined).

TABLE VII

DATA FOR PUPILS AS PAIRED FOR INSTRUCTION, ONE IN A SMALL AND THE OTHER IN A LARGE CLASS

Pair No.		C. A. 1-1-29	C. A. at TGT	TGT IQ	Att. F. H.	Alg. FI 12-10-28	Alg. FII 3-18-29	Marks 3-18-29	Alg. FI 5-28-29	Marks 5-28-29	Att. Sem.
TEACHER A (Boys, IQ below 103)											
I.	S	184	177	95	32	9	36	2	58	2	56
	L	184	176	97	43	9	50	8	55	5	69
II.	S	175	167	97	44	11	32	2	39	2	74
	L	175	168	97	42	14	26	5	53	2	68
III.	S	170	168	93	44	7	42	7	41	8	74
	L	172	164	98	36	5	14	0	22	2	64
IV.	S	183	175	93	22	9	20	2	33	2	51
	L	179	171	92	40	9	36	5	36	2	67
V.	S	186	182	98	39	24	24	2	50	5	73
	L	187	184	93	40	24	41	2	24	2	69
VI.	S	172	167	98	39	24	28	2	44	5	74
	L	172	164	98	44	26	26	5	45	2	72
VII.	S	189	181	97	32	11	11	0	37	0	55
	L	185	177	93	40	11	27	0	29	0	72
VIII.	S	177	169	95	43	10	26	2	44	2	74
	L	177	168	93	44	11	27	6	44	5	74
IX.	S	177	169	98	42	39	55	8	65	8	74
	L	178	171	99	44	34	51	5	47	8	74
X.	S	188	181	95	43	30	37	4	44	2	74
	L	195	178	96	44	34	33	2	46	2	66
Mean	S	180.1	173.6	95.9	38.0	17.4	31.1	3.1	45.5	3.6	67.9
σ_x		2.0	1.9	.6	2.2	3.3	3.6	.8	2.9	.7	2.9
Mean	L	180.4	172.1	95.6	41.7	17.7	33.1	3.8	40.6	3.0	69.5
σ_y		2.2	2.0	.8	.8	3.3	3.5	.8	3.5	2.2	1.0
σ_d		3.0	2.7	1.0	2.3	4.6	5.0	1.1	4.6	2.3	3.1

TEACHER B (Boys, IQ above 102)

I.	S	156	152	130	35	27	37	5	51	5	81
	L	160	152	132	49	32	49	8	59	8	80
II.	S	170	163	121	48	35	73	11	93	11	89
	L	165	157	120	49	36	66	11	65	8	89
III.	S	174	156	113	49	24	50	8	70	8	90
	L	173	165	115	46	27	37	5	40	5	77
IV.	S	178	174	106	49	16	43	5	52	5	90
	L	182	177	105	47	17	19	5	37	5	88
V.	S	161	154	121	40	59	79	11	112	11	81
	L	164	157	117	44	51	62	8	84	11	82
VI.	S	165	157	125	48	50	66	11	81	11	89
	L	169	165	130	49	52	62	11	94	11	89
VII.	S	168	160	114	49	27	61	11	72	8	90
	L	166	158	114	46	28	31	5	47	5	84
VIII.	S	186	168	115	49	14	56	8	60	8	86
	L	180	167	114	48	18	48	8	56	8	84
IX.	S	188	180	110	49	5	22	5	38	5	90
	L	178	170	108	40	4	23	5	14	0	80
X.	S	167	159	122	49	34	55	8	66	8	88
	L	164	157	119	47	30	42	8	69	8	84
XI.	S	169	160	107	38	8	41	5	58	8	83
	L	170	162	113	49	8	33	5	38	5	90
XII.	S	175	171	113	49	13	31	5	45	5	85
	L	169	165	114	47	11	35	5	45	5	88
XIII.	S	178	164	115	49	46	61	8	62	8	84
	L	172	164	116	49	41	69	11	75	11	89
XIV.	S	175	171	116	46	45	68	11	84	11	85
	L	174	166	123	46	42	53	8	59	8	83
XV.	S	170	162	110	49	6	51	8	68	8	90
	L	168	161	106	47	12	36	5	51	5	76
Mean	S	172.0	164.1	115.9	46.4	27.3	52.9	8.0	67.5	8.0	86.7
σ_M		2.1	1.7	1.8	1.2	4.3	4.0	.5	4.6	.6	.9
Mean	L	170.3	162.9	116.4	46.9	27.3	44.3	7.2	55.5	6.9	84.2
σ_M		1.6	1.6	1.9	.6	3.8	3.9	.6	5.1	.8	1.3
σ_d		2.7	2.3	2.6	1.3	5.8	5.6	.8	6.9	.9	1.4

TEACHER C (Girls)

I.	S	188	183	86	49	30	32	11	26	8	88
	L	191	194	81	44	24	9	2	25	2	82
II.	S	180	173	96	49	13	17	5	19	5	91
	L	177	170	98	47	15	36	11	28	8	91
III.	S	173	170	108	48	20	41	11	53	8	90
	L	173	164	105	47	22	40	8	34	5	91
IV.	S	196	188	81	47	4	17	2	15	2	86
	L	194	186	86	49	4	14	0	10	2	90
V.	S	163	156	124	49	28	32	8	41	8	92
	L	169	161	116	48	26	33	9	61	8	92
VI.	S	178	174	105	48	33	58	11	64	11	92
	L	178	173	104	49	33	34	4	56	5	93
VII.	S	171	162	119	49	25	43	8	57	8	93
	L	169	163	114	49	23	34	5	40	5	92

VIII.	S	177	173	96	47	3	23	2	24	5	88
	L	181	176	93	48	5	30	9	30	5	92
IX.	S	175	167	112	46	37	44	8	51	8	99
	L	173	165	113	49	40	54	8	64	11	93
X.	S	199	191	72	44	5	11	2	15	2	93
	L	179	170	81	48	2	5	0	9	2	92
XI.	S	174	167	95	47	5	16	8	20	6	90
	L	176	169	94	47	7	19	2	18	2	88
XII.	S	179	175	105	49	17	30	11	43	8	93
	L	177	170	106	49	19	21	4	34	2	93
XIII.	S	181	173	99	45	5	13	5	24	5	84
	L	180	173	98	48	7	18	5	50	5	90
XIV.	S	179	167	102	46	7	13	2	38	5	88
	L	177	169	104	47	9	20	1	29	2	88
XV.	S	187	182	99	49	22	18	5	25	2	93
	L	182	174	98	48	25	44	8	38	6	84
Mean	S	180.0	173.4	99.9	47.5	16.9	27.2	6.6	34.3	6.7	90.7
σ_M		2.3	2.4	3.4	.4	2.9	3.5	.9	4.1	.7	.9
Mean	L	178.4	171.8	99.	47.8	17.4	27.4	5.1	35.1	5.0	90.7
σ_M		1.8	2.2	2.8	.3	2.9	3.4	.9	4.2	.7	.8
σ_d		2.9	3.2	4.4	.5	4.1	4.9	1.3	5.9	1.0	1.2
					ALL BOYS						
Mean	S	175.2	167.9	107.9	43.0	23.3	44.2	6.0	58.6	6.2	79.2
σ_M		1.7	1.9	2.2	1.4	3.1	3.6	.7	3.8	.6	2.2
Mean	L	174.3	166.5	108.1	44.8	23.2	39.8	5.8	50.4	5.3	78.3
σ_M		1.6	1.5	2.4	.7	2.6	2.9	.6	3.7	.6	1.7
σ_d		2.4	2.4	3.2	1.6	4.1	4.7	.9	5.3	.9	2.8
					BOYS AND GIRLS						
Mean	S	177.0	170.0	104.9	44.7	20.9	37.8	6.3	49.6	6.2	83.5
σ_M		1.4	1.3	2.0	1.0	2.3	2.9	.5	3.4	.5	1.7
Mean	L	175.7	168.5	104.8	45.9	21.2	37.7	5.6	44.6	5.2	82.7
σ_M		1.3	1.3	1.9	.5	2.0	2.5	.5	3.0	.5	1.4
σ_d		1.9	1.9	2.8	1.1	3.0	3.9	.7	4.5	.7	2.2

From the means and standard deviations of the differences between these means, as given at the very foot of Table VII, the following general conclusions may be drawn relative to all the paired children participating in the investigation:

1. The mean differences on the items on the basis of which the children were paired (chronological age, chronological age at time of testing with Terman Group Test, Terman Group Test IQ, and initial score on the Content Test in Elementary Algebra) show no significant differences between those instructed in large and those instructed in small classes.

2. Significant differences in accomplishment as measured by both the Algebra Content Test and teachers' marks appear, the latter at the mid-

and both at the end-semester testing—the students in the small classes evidencing, for the semester, unquestioned superior accomplishment as compared with their peers in the large classes. It will be noted that this superiority had overcome, by the mid-semester testing, a mean differential of 1.2 days' attendance in favor of the large class (a difference slightly greater than its standard deviation). In other words, though the students in the small classes attended school considerably less the first half of the semester, they learned decidedly more algebra than did their peers in the large classes. By the end of the experimental period the students in the small classes were slightly superior to their peers in the large classes in attendance for the entire semester (the mean difference in their favor being .8 days—the standard deviation of this difference being 2.2). The difference in algebra accomplishment evidenced at this time, both by test scores and by teachers' marks, may not be accredited to this slightly superior attendance[20]—the mean superiority of the students in the small classes over their peers in the large classes is, for the Algebra Content Test, 1.1 times the standard deviation of the difference between the means, and for teachers' marks, 1.4 times the standard deviation of the difference between the means.

An examination of the data for the boys considered alone reveals the same general tendencies as those noted for the boys and girls combined. There is, however, a more marked superiority of the boys in the small classes in the algebra tests, this being particularly true at the mid-semester testing. It appears that the boys in the small classes did not impress their teachers as favorably as did the girls in the small class, judged by their relative superiority over their peers in the large classes. At the mid-semester testing, the teachers' marks for the boys in the small classes exceeded those of their peers in the large classes by only .2 of the standard deviation of the mean difference, while those of the girls in the small class exceeded those of their peers in the large class by 1.2 times the standard deviation of the mean difference. Similarly, the end-semester marks showed a superiority of small-class instruction for the boys as being 1.0 times the standard deviation of the mean difference, while for the girls it was 1.8 times the standard deviation of the mean difference.

From the above it will be noted that the only difference of any marked significance, so far as the girls are concerned, had to do with

[20] See footnote 17, for a statement concerning the correlation between achievement in algebra and days attended.

teachers' marks, those in the small class exceeding their peers in the large class for both the first half and for the entire experimental period.

Of the boys with IQ's above 102, those instructed in small classes achieved more satisfactorily, as measured by both teacher's marks and algebra scores, at both the mid- and end-semester testings. During the first half of the experimental period the "bright" boys in the large class attended slightly more regularly than those in the small class. By the end of the semester this situation was reversed, there being a marked attendance difference in favor of the small classes (2.5 days, or 1.8 times the standard deviation of this difference.)[21] It is to be noted that the small class of "dull" boys (IQ below 103) scored considerably higher for the semester period on both the teacher's ratings and the algebra test than did their peers in the large class, despite the fact that they attended considerably less regularly.

In general, we may conclude from our study that achievement in elementary algebra is more rapid in small than in large classes. Probably these differences, as measured by the Algebra Content Test, may be most clearly interpreted from Table VIII, where the mean gains, standard deviations of these gains, and quotients of the two with the gains as numerators, are given for the children in the small classes,[22] and for their peers who were instructed in the large classes. This procedure is legitimate, since the populations are identical for the groups compared, and since the data on the basis of which the children constituting these groups were paired were, on the whole, practically equivalent (see Table VII). It will be noted that children instructed in small classes uniformly made more significant gains, for the full semester period, as measured by the algebra tests, than did their peers in the large classes. The fact that this is not so generally the case for the shorter period of experimentation might reasonably be interpreted as indicating that experiments of this nature should extend over periods at least as long as a semester. The product-moment correlation coefficients given in Table VIII are between algebra test scores at the three testings (December 10, 1928, March 18, 1929, and May 28, 1929). These are, of course, essential to the determination of the standard deviations of the differences (see footnote 19).

[21] See footnote 17.

[22] This terminology is used, even though the small classes contained three children who were not paired, they being included to obtain comparability of means, standard deviations and ranges (see footnote 7).

TABLE VIII

SIGNIFICANCE OF DIFFERENCES BETWEEN MEAN GAINS IN ALGEBRA CONTENT TEST SCORES IN LARGE AND SMALL CLASSES FOR PAIRED GROUPS

	N	M_2-M_1*	$\sigma_{M_2-M_1}$	$\frac{M_2-M_1}{\sigma_{M_2-M_1}}$	M_3-M_1	$\sigma_{M_3-M_1}$	$\frac{M_3-M_1}{\sigma_{M_3-M_1}}$	r_{12}	r_{13}
Boys, IQ below 103									
Small Class	10	13.70	3.4	4.03	28.10	3.1	9.07	.53	.59
Large Class	10	15.40	3.1	4.97	22.90	4.2	5.45	.41	.20
Boys, IQ above 102									
Small Class	15	25.66	3.4	7.56	40.20	2.0	20.10	.69	.93
Large Class	15	17.66	2.4	7.12	28.26	2.9	9.74	.81	.82
Girls									
Small Class	15	10.27	2.3	4.47	17.40	3.0	5.80	.76	.69
Large Class	15	10.40	2.0	5.20	17.67	3.1	5.71	.81	.69
All Boys									
Small Class	25	20.88	2.9	7.20	35.32	2.2	16.05	.66	.82
Large Class	25	16.60	1.5	11.06	27.12	2.3	11.78	.85	.79
Boys and Girls									
Small Class	40	16.90	2.0	8.45	28.62	2.2	13.01	.72	.77
Large Class	40	16.50	1.7	9.72	23.45	2.0	11.73	.76	.76

* The items in the caption have already been explained in connection with Table VI.

It will be noted from Table VIII that there are superior average gains on the part of students receiving instruction in small classes over those receiving instruction in large classes for the full semester period in every instance, though these are not significantly large in the case of the girls,[23] who in fact tend to conceal the superior gains of the small-class boys when data for the two sexes are combined.

Conclusions from the mid-semester measurements are less positive, though they point in the same general direction. An examination of the significance of the differences between mean gains of the children in the small classes and their peers in the large classes on the Algebra Content Test may be made directly from Table VIII. Stated statistically, the children in the small classes made test gains which exceeded the test gains of their peers in the large classes by 1.7 times the standard deviation[24] of the difference between these gains; there were no significant differences between instruction of girls in large and small classes, as measured by this technique; the boys in the small classes made gains which exceeded those of their peers in the large classes by 2.6 times the standard deviation of the difference between the gains; for the "bright"

[23] This difference may be interpreted as ample justification for separation of the sexes in the present study.

[24] As these differences are uncorrelated, their standard deviations are obtained by the formula, $\sigma_d = \sqrt{\sigma_1^2 + \sigma_2^2}$. See footnote 19.

boys (IQ above 102) this same ratio in favor of small-class instruction is 3.4; for the "dull" boys (IQ below 103) it is 1.0. Similar examination of the first-half-semester gains indicates, as has been stated, that experiments of this type should cover at least one semester, and, if possible, a longer period.

A study of the semester grades in English of the children participating in the present experiment gives further evidence of the superiority of instruction in small rather than in large classes.

It will be remembered that the controlled conditions were identical with respect to the English and algebra classes, except that the only measurements of achievement available in English were the teachers' semester marks. (see p. 341). It was not intended originally that the study should concern itself with instruction in English. The control of conditions under which the English classes were instructed was incident to the investigation as it affected instruction in the algebra classes. The care with which these conditions were controlled makes an examination of the relative merits of instruction in large and small English classes quite desirable, despite the fact that the measures of accomplishment were not as adequate as would be desired were we to project an experiment to measure relative accomplishment in this field. Table IX gives the means, standard deviations, and populations for the teachers' marks in English for each of the classes considered as a unit, and for each group of children instructed in a small class, as well as for their peers who received

TABLE IX

RELATIVE MERITS OF INSTRUCTION IN LARGE AND SMALL SECOND-SEMESTER NINTH-GRADE ENGLISH CLASSES, AS MEASURED BY TEACHERS' MARKS*

	For Entire Group			For Paired Groups		
	N	Mean	S.D.	N	Mean	S.D.
Teacher D (Boys, IQ below 103)						
Small Class	10	4.8	2.8	10	4.8	2.8
Large Class	40	3.7	3.1	10	3.2	3.2
Teacher E (Boys, IQ above 102)						
Small Class	16	6.9	2.3	15	7.2	2.0
Large Class	46	4.8	3.5	15	4.5	3.1
Teacher F (Girls)						
Small Class	17	4.6	2.9	15	4.1	2.8
Large Class	43	4.6	2.9	15	4.1	2.9
All Boys						
Small Class	26	6.1	2.7	25	6.2	2.7
Large Class	86	4.1	3.5	25	4.0	3.2
Boys and Girls						
Small Class	43	5.5	2.9	40	5.5	2.9
Large Class	129	4.3	3.3	40	4.3	2.9

* The marks are expressed as explained on p. 345.

instruction in a large class for the semester period. The data are pr
sented in such a manner that comparisons are possible for the sexes sep
rately and combined. It will be noted that there is a marked superiorit
of small-class instruction in every instance for the boys, as judged b
the mean of the teachers' marks. While the data for the girls show n
differences of any significance (they are, in fact, almost identical for th
large and small class), the superior gains of the boys instructed in sma
classes are great enough to appear as significant differences even whe
combined with the data for the girls.

In the light of the results reported in this study, the authors woul
suggest that many very definitely controlled experiments are necessar
before the "class-size" problem can be solved adequately from either a
administrative or an educational viewpoint. If the present study ha
shown anything, it is the danger of drawing conclusions from inade
quately controlled investigations. The reader will note that many of th
factors which have not been under control in other experiments have bee
kept constant in the present study. Detailed plans for further studie
should be formulated in the light of the investigations already made, an
should be adapted to the conditions under which the studies are to b
conducted. The present study will suggest some of the factors whic
must be controlled if reliable conclusions are to be drawn. From th
present study we may conclude with a reasonable degree of certainty tha
instruction in small classes, measured in terms of individual studen
progress, is superior to instruction in large classes in second-semeste
high-school algebra. The conclusion from progress in the correspondin
English classes, though based upon less adequate measurements, indicate
a similar superiority of small-class instruction.

CASE STUDIES OF THE RELATIONSHIP BETWEEN HIGH-SCHOOL ACHIEVEMENT AND EDUCATIONAL COUNSELLING

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THE purpose of the following study was to determine whether or not the Stanford Revision of the Binet-Simon Test could be used profitably in educational counselling. The *Journal of Educational Research*, February, 1923, published the record of the achievements of a class of thirty pupils after one year in high school. This paper will trace these students, their scholastic success as well as social and moral traits, throughout their high-school life. The material presented is the result of case studies of the scholastic achievements as well as evidences of the development of character and personality traits of every member in the class.

These pupils entered high school from an elementary school that, because of its location near the center of the city, had a transient enrollment. Only twelve of the thirty pupils under consideration had been enrolled in the school before the seventh grade. Four pupils entered the school in grade eight-A. As might be expected under such conditions, there were marked differences in habits, training, and knowledge of subject matter, as well as in ability.

Table I shows that at the time these data were collected, (February 1, 1925), sixteen pupils had been graduated, three, who were still in school, expected to be graduated in June, 1925, and eleven had dropped out. The CA, MA, and IQ from the table used in the first study have been repeated in Table I of this study. The pupils are here ranked with reference to IQ. The high-school averages are averages of all the grades made by these students up to February 1, 1925.[1] Some represent

[1] It must be noted that Lewis and Clark high-school grades are on a percentage basis, and that North Central uses the letter system. In converting the letters to percents, the median of the range of each letter has been used. This obviously prevents exact comparisons, but it seems to be the fairest plan for this study. Pupils 4, 5, 6, 11, 13, 16, 17, 18, 26, 27, and 30 were graded in letters. The value of each letter and the medians used are as follows:

Letter	Equivalent	Median
A	95-100	97.5
B	89-94	91.5
C	82-88	85
D	75-81	78
F	Below 75 (Failure)	

TABLE I

HIGH-SCHOOL RECORD OF PUPILS RANKED ACCORDING TO INTELLIGENCE QUOTIENTS

When entering H.S.

Case	C A	M A	I Q	Av. H.S. %	Course	Failing Marks	No. A's N.C.	No. 90's L.C.	Drop'd H.S.	Date Graduated	Yrs. in H.S.
1	11-4	17-10	157	90.5	Class.			24		6-'24	4
2	14-1	18-9	133	86	Gen.			9		6-'23 Pri. Sc.	3
3	12-6	15-8	125	84	Class.	Lat. IV-V		7	11B	6-'24	3
4	13-2	16	121.5	89.3	Scien.	Lat. II	7			6-'24	4
5	13-2	15-9	119.6	95	Class.		21			6-'24	4
6	14-6	16-9	115.5	87	Com.	Arith.	1			6-'24	4
7	14-3	16-5	115	83	Com.			2	10B	....	1½
8	13	14-8	112.8	87	Class.			8		6-'24	4
9	13-7	15-3	112	81	Scien.	Physics		4		6-'25	4
10	13-3	14-10	111.9	85	Gen.	French III		4		1-'24	3½
11	13-9	15-1	109.7	92	Scien.		17			1-'24	3½
12	14	15-4	109.5	87	Class.			5		6-'24	4
13	13-6	14-8	108.6	82	Scien.					6-'24	4
14	14-2	15-4	108	74	Scien.				9A	....	½
15	14-9	15-2	102.8	82	Com.	Bkk'g I		1		6-'24	4
16	15-5	15-7	101.0	85	Scien.	Pub. Speak.				6-'24	4
17	14-9	14-10	100.5	79.7	Com.	Type Civics Hist. II Hist. III	1			6-'25	5
18	13-9	13-6	98	90	Scien.		4			6-'24	4
19	15-3	14-8	96	88	Dom. Sci.			1	9A	....	½
20	13-10	13-4	96	86	Com.	Bkk'g II Bkk'g III		9		6-'24	4
21	13-7	13-1	96	80.8	Com.	Gen. Sc. Bkk'g IV	2			6-'24	4
22	15-6	14-10	95	81	Com.	Spanish English V				6-'25	4
23	14-10	14-1	94.9	79	Com.				11A	....	2½
24	14-6	13-9	93	82	Gen.			1	11B	....	2
25	16	14-7	91	69	Com.	Arith. English Gen. Sci.			9B	....	½
26	14-6	13-1	89	76	Gen.	Spanish Geom. II			11B	....	2
27	14-3	12-5	87	85	Com.	Shorthand Type				1-'25	4½
29	15-2	11-5	75	80	Com.	Gen. Sci.			9A	....	½
30	16-9	11-11	74	68	Gen.	Algebra History English			9A	....	1

averages of one semester only, but the table shows in each case when the pupils finished.

In Table II the pupils are ranked according to high-school averages. The difference in the difficulty of courses and different standards of teachers make the comparisons between high-school averages and IQ's

only approximate. Since IQ's range from 157 to 74, the high-school averages might be expected to show a considerable difference. Number 30, with an IQ of 74, dropped out in 9A. The average for Number 29

TABLE II

RANK ACCORDING TO HIGH-SCHOOL AVERAGES AND COMPARISON OF INTELLIGENCE QUOTIENTS AS FOUND BY THE STANFORD REVISION TEST WITH OTIS SCORES

Case	IQ	Otis	H.S. Average	Class Failures	Time Spent
5	119.6	145	95		4 years
11	109.7	166	92.8		3½ years
1	157	159	90.78		4 years
18	98	147	90		4 years
4	121.5	160	89.3	1	4 years
6	115.5	155	87	1	4 years
8	112.8	158	87		4½ years
12	109.5	150	87		4 years
2	133	156	86		3 years
20	96	136	86	2	4 years
10	111.9	159	85	1	3½ years
16	101	152	85	1	4 years
27	87	99	85	2	4½ years
15	102.8	154	82	1	4 years
13	108.6	127	81.9		4 years
21	96	118	80.8	2	4 years
		Graduated in June 1925			
9	112	147	81	1	5 years
22	95	135	81	2	5 years
17	101.5	103	79.7	4	5 years
		Dropped			
19	96	146	88		½ year
3	125	153	84	2	3 years
7	115	123	83		1½ years
24	93	124	82		2 years
29	75	84	80	1	1 year
23	94.9	133	79		2½ years
28	85.5	127	78	3	½ year
26	89	96	76	2	2 years
14	108	127	74		½ year
25	91	...	69	3	½ year
30	74	84	68	3	1 year

is for freshmen year only, as she then moved to a Canadian village. Number 28 dropped at the close of 9B, and Number 27 graduated in January, 1925. Since Number 27 has the lowest IQ of any who finished in Spokane schools, we may consider the range to be from 157 to 87, or 70 points. The difference in averages made by Number 1, IQ 157, and Number 27, IQ 87, was only five points, but Number 27 failed in short-

hand and typing, and took an extra semester to make them up. In her case and in all other cases of failure when the work was later made up the passing grade is used in the average instead of the failing mark. Number 1, graded on a percentage basis, averaged 90.78, and kept her grades above 85, with the exception of 81 received in History VIII, and 83 in Latin V. Number 27 had eleven D's, two F's, and only one A. If the ease in learning and the time spent are considered, the difference is greater than that represented in averages of grades. The highest average was made by Number 5, with an IQ of 119.6. He is two years older chronologically than Number 1, but Number 1 is two years older mentally. Number 5 was graded on the letter basis which may make his average of 95 inaccurate, but it is not likely to be lower than Number 1's. There are 37 points in favor of Number 1's IQ. Number 5's persistence and ambition seem to have offset Number 1's natural advantage. Seven of Number 5's eight grades during his fourth year were A's. The other was B. During the entire four years he had twenty-one A's, eleven B's, and one C. Number 11, IQ 109.7, is also graded in letters, and his average, 92.8, excels 1's. He graduated in 3½ years from the scientific course with the second highest average in the group.

It is apparent from the failing grades in Table I, that other factors than IQ are responsible for the failures of Numbers 3, 4, 6, 9, and 10. Beginning with Number 15, IQ 102.8, failures are shown in eleven of the sixteen remaining cases. Of the five against whom no failures are shown, four dropped, Number 18, IQ 98, being the only one to finish with a "no failure" record. Number 18's perseverance, ambition, and proper attitude toward his work made his record the most remarkable in this group. He graduated with 6 A's, 15 B's, and 11 C's. He was one of the group of the first thirty in grades in a class of more than 200.

From this study, it seems that desirable traits of personality and a proper attitude toward work minimize the handicap of those having only moderate ability. Among the ten students having IQ's above 110, there were only six class failures. Two of these were made by Number 3, whose IQ was 125. Whenever work became difficult, or when he had a teacher he did not like, he made no effort. Number 4 had an "easy" teacher in Latin I, but had one who was exacting in Latin II. Her teacher in Latin I probably should share with Number 4 the responsibility for her failure in Latin II, since she was rated as conscientious

and ambitious. Number 6 was lazy, afflicted with inertia, and did not like arithmetic. Number 9's physics grade of 47 may be explained by his care-free attitude and willingness to work only when interested. Number 10 evidently found French her hardest subject, her grades being 86, 76, 72, 79, with 84 as a make-up grade. Her general average was 85, and she graduated after 3½ years.

Failures occurred in fourteen subjects. Bookkeeping led with five; general science and English each had four; Latin, arithmetic, and history, all had three; typing, two; and physics, French, public speaking, shorthand, algebra, civics, and Spanish, each had one. Only two of the eleven taking the commercial course had no failures. Both of these dropped school: Number 7 in 10B, and Number 23 in 11A. Of the five in the classical course, only one had a failing grade. Of the six in the scientific course, Numbers 4 and 9 each had one failure. Among the six in the general course, three had one or more failing grades. Other studies have shown that those students whose IQ fall below 100 usually have difficulty with high-school work. With the exception of Number 18, all of those below 100 IQ failed in some of the work, making a total of 20 class failures for the group. Eight of the ten who dropped also belonged to this group. Of those who dropped from high school, Numbers 14, 23, 24, and 29 moved away. Numbers 3 and 7 left because of moral difficulties, Number 19, because of poverty and shiftlessness, and Numbers 25 and 30, left because of failure. Sixty-four grades above 90 and forty-seven A's were made by students with IQ's above 100. Four A's and twelve grades above 90 were made by students below 100.

As the purpose of this study was to test the validity of basing recommendations of high-school courses on the IQ as determined by the Stanford Revision of the Binet-Simon test, it seems, with the facts arrayed before us, as if the courses selected for these students were only fairly well adapted to them. Thirty percent dropped, but seventy percent graduated. All the classical students graduated, although Number 3 did so from a private school. He was, also, the only one to fail. The general course seemed well chosen by Numbers 2 and 10. The scientific course was accomplished by Numbers 4, 9, and 13 with one failure each. Number 16 failed in public speaking which he took as an extra subject. Numbers 11, 13, and 18 had no failures. Every one of the seven commercial course students who graduated failed at least once, and together they made fifteen class failures. Number 22 failed only in Spanish and

English. Number 21 failed in general science and bookkeeping. The others failed in the commercial subjects only. Three of these, Numbers 17, 22, and 27, were not able to finish in the four years, Number 27 taking an extra semester, Number 17, an extra year because of failures, and Number 22 an extra year because of economic reasons which kept him out of school. The others were able to do the work in four years. Number 20 started college work but married in the middle of the year. Numbers 15 and 21 have good positions. Number 6 went to business college to acquire speed and accuracy in typing before taking a position.

The students in the classical and scientific courses had less difficulty with their work than the commercial students had with the distinctly commercial subjects. The make-up grades that were counted in the averages of the commercial students, however, were as good in most cases as their passing grades in other subjects. The prevalent belief that the commercial subjects offer fewer difficulties than the usual academic subjects is not borne out by the accomplishments of this group. To do creditable work of the commercial course in four years seemed to require an IQ of at least 100, plus willingness to work.

The Otis scores shown in Table II were taken from Table I of the previous study. Ranking by Otis scores required almost an entire rearrangement of the class. In two instances, the Otis test seemed to have discovered abilities more exactly than the Stanford Revision test. Numbers 16 and 17 differed .5 in IQ and 49 points in Otis scores. Number 16 had an average of 85 and failed only in Public Speaking. Number 7 had an average of 79.7 and failed in Typewriting, Civics, History II and History III. Number 2 with an IQ of 133 and an Otis score of 156, ranked ninth in high-school averages, but he finished in three years and has done excellent work at a university. Number 18, whose high-school record was fourth highest, ranked eleven in Otis scores. Qualities which enabled him to do such excellent high-school work were not disclosed by either test. On the other hand, Number 5, who ranked first in high-school grades, was twelfth in Otis scores. Number 4, who ranked fifth in high-school averages, was first in Otis scores.

From this study the following conclusions may be drawn:

1. That while the IQ found by the Stanford Revision test indicates fairly well the ability of pupils to do high-school work, other factors tend to modify the quality of performance.

2. Proper social attitudes as well as proper attitudes toward work are highly important in the accomplishment of high-school work.

3. Training in persistence, perseverance, self reliance, and industry as well as moral guidance are important elements in helping the student to utilize his ability.

4. High-school work can be done by pupils with IQ's as low as 75, but it requires a longer time and repetition of work in most cases below 100, and such pupils frequently drop from school.

5. Provision should be made for minimum courses and short courses leading directly into a vocation for pupils with IQ's below 100.

6. Educational guidance should be exercised for the benefit of all students to discover causes of failure and to direct pupils into courses suited to their interest and ability.

SUSTAINED APPLICATION IN NINTH-GRADE MATHEMATICS

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THE purpose of this study is to determine the nature and status of the study habits of 92 ninth-grade pupils under a directed study program in general mathematics. The problem is a consideration of the pupil's degree of sustained application while the directed study activities were in progress. The aspects to be treated involve the extent of application, the span of application, and the relationship of application to achievement. The method of attack takes into account (1) the average index of application and the nature of the resulting distributions; (2) the average span of application and various types of intervening distractions; and (3) the interrelationships between application, intelligence, and achievement.

Before explaining the phases of treatment in detail, it seems appropriate to describe the technique used for measuring sustained application.

MEASURING SUSTAINED APPLICATION

During each of the two school years 1927-8 and 1928-9, the writer conducted two ninth-grade classes in mathematics at the University High School, University of Minnesota. The procedure employed was a directed study program similar in most respects to that recommended by Breslich.[1, 2] The organization and presentation features were according to his unitary plan where the teaching activities of the unit precede several days of directed study activities which constitute the assimilative period. The variations occurred in the testing phase[3] which was more complete than that described in Breslich's writings.

The data on sustained application were collected by senior students in the College of Education at the University of Minnesota who were in

[1] Breslich, E. R. "The Unitary Organization of the Mathematics of the Seventh, Eighth, and Ninth Grades." *The Mathematics Teacher*, XVI, (April, 1923), 228-37.

[2] Breslich, E. R. "Supervised Study in Mathematics." Proceedings of High School Conference. University of Illinois Bulletin, 1914, pp. 247-58.

[3] Stokes, C. N. "Teaching for Mastery in Junior High-School Mathematics with Emphasis upon the Testing Phase." *Educational Outlook*, School of Education, University of Pennsylvania. IV, (October, 1929), 7-18.

attendance as observers. Three to five of these observers were present at all times. They occupied chairs at a table in the front of the classroom and faced the pupils of the class. One of the observers obtained a profile of a single pupil for the day—an entire fifty-minute period of study. A stop watch was used to determine the extent of the periods of sustained application and periods of distraction. Any activity bordering on distraction was recorded as such. The data gave an index of application that was computed by finding the ratio between actual time of application and time spent in class.

This technique was originated by Morrison.[4] It was created primarily for the purpose of obtaining effective group teaching, and its use, for the most part, is recommended in individual pedagogical case work. The writer has attempted to apply it to the classroom situation and the data for this study are based on four profiles, hence four indices of application for each pupil. These indices were obtained at intervals of two

FIGURE I. INDICES OF APPLICATION OF 92 PUPILS IN NINTH-GRADE GENERAL MATHEMATICS

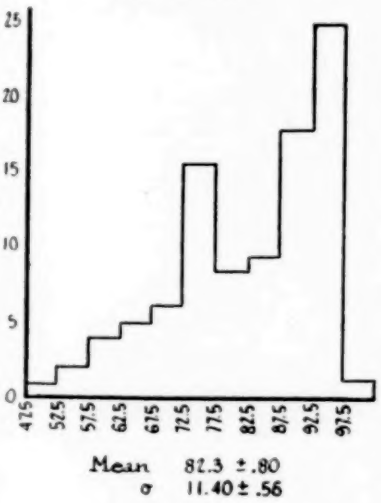
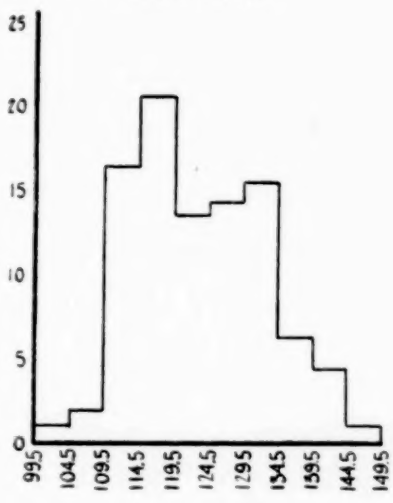


FIGURE II. INTELLIGENCE QUOTIENTS OF 92 PUPILS IN NINTH-GRADE GENERAL MATHEMATICS



[4] Morrison, H. C. *Principles of Teaching in the Secondary School.* (Chicago: University of Chicago Press, 1926), Chap. IX.

months and their average is used here as the pupil's true index of sustained application. The findings are presented in Figure I.

VALIDITY AND RELIABILITY OF THE TECHNIQUE

As far as the writer is aware, no effort has been made to determine the validity and reliability of this method of measuring sustained application. In order to test the technique, two brief experiments were conducted. To ascertain the reliability, the writer and a college student who was making the records of application in the study, visited another classroom where a directed study procedure similar to that explained above was in progress. The subject of study in this class was also ninth-grade mathematics. Two profiles of a single pupil were thus obtained for the day—a full study period of 50 minutes. This procedure was continued until the entire group of 25 pupils was covered. The indices were then computed for each of the two sets. These data produced a coefficient of correlation of .883 by the Rank Difference Method.

The second experiment was made in order to obtain some kind of a check as to the validity of the technique. Professor H. R. Douglass, of the University of Minnesota, suggested that the relationship between indices computed from profiles that pupils made of themselves and those made by the writer be determined. This was done in a tenth-grade class where the pupils were members of the groups that were studied during the previous year. These pupils were shown some of the profiles that had been made of them. The technique of profile construction was then explained fully, and the utmost conscientiousness regarding the recording of data was urged.

While the pupil was making his own profile, the writer was also making a chart of his study habits. The pupil, however, was not aware of this procedure. The profiles thus obtained covered a full study period of 50 minutes as usual. The same procedure was repeated with 25 pupils and the double records resulting from these activities produced a coefficient of correlation of .878 by the Rank Difference Method.

Now, as a result of the above correlations, it seems safe to conclude that the reliability and the validity of the technique are sufficiently high to allow reasonable confidence to be placed in the data of this study on the measurement of sustained application.

TREATMENT OF THE DATA

In employing statistical methods to treat the phases of the problem as stated above, the mean was chosen as a measure of central tendency;

the sigma, the skewness and kurtosis constants, X^2 (chi-square), and P (the probability of occurrence) were chosen to express the nature of the distributions; and the coefficients of correlation were chosen to express the inter-relationships.

Furthermore, the probability that pupils of one sex rather than of the other may show a high degree of sustained application rather than a low one will be expressed by means of the bi-serial r.

In using the above methods, it becomes necessary to make the following assumptions:

(1) Pupils achieve and exercise sustained application according to the law of normal distribution.

(2) The scores are samples of an indefinite number of indices collected over an indefinite period of time.

(3) The validity and reliability are sufficiently high to render the measuring instruments trustworthy.

If and when these conditions are met, the laws of probability may be applied and any errors may be assumed to be only those which normally arise from fluctuation of sample.

The Degree of Sustained Application.—The indices, which are the bases for the graph of Figure I, have an average ratio of application to total working time of 82.3 percent. Whether this is high or low would be simply a matter of assumption for Morrison does not attempt to present sufficient data gathered in this manner to establish a norm for purposes of comparison.

The central tendency of the distribution, however, does not tell the entire story. A knowledge of the nature of the distribution will portray some interesting facts. The variability, expressed by means of the sigma, indicates to a certain extent how the measures cluster about the central tendency. The value of sigma here is $11.4 \pm .56$ and, of course, measures only an absolute variability. A check may be made by computing the skewness and kurtosis constants. Skewness interprets the slope of the variation curve in that it is a measure of the degree of asymmetry. Variation curves may be symmetrical about an average, or there may be skewness to the extent that the variates tail off more widely or less abruptly on one side of the central tendency than on the other. One formula[5] for measuring skewness is

[5] Pearl, Raymond. *Medical Biometry and Statistics.* (Philadelphia: Saunders Company, 1923), p. 277.

$$X = \frac{\sqrt{\beta_1}\,(\beta_2 + 3)}{2\,(5\,\beta_2 - 6\,\beta_1 - 9)}$$

where X may have values above or below zero thus indicating the degree of skewness.

Kurtosis measures a type of departure from normality. The formula,[6] is

$$Y_2 = \frac{\mu_4 - 3\mu^2_2}{\mu^2_2}$$

measures a symmetrical type of departure where either the peak and the tails of the curve are increased at the expense of the intermediate parts or they are decreased to make the curve comparatively flat.

The values of the above constants for the distribution of the true indices of sustained application are

$$sk = -.94$$
$$kur = -.88$$

which means that the scores are piled slightly at the upper end and the curve representing the distribution is quite flat.

A final check on the nature of the curve is "goodness of fit." Its usefulness here entails the determination of the variability from the theoretical (Gaussian) curve. In applying this test it must be assumed that the frequencies of the distribution are samples from a normal system of variates. It shows whether the discrepancies between any series of observed frequencies and those postulated by theory may have resulted from the operation of random sampling. The computations are made by the use of the formula

$$X^2 = \Sigma \frac{(m_1 - m)^2}{m}$$

where m^1 represented the observed and m the expected or theoretical frequencies. The X^2 can then be interpreted in terms of the probability of occurrence by means of tables given by Elderton.[7] The values found are

$$X^2 = 30.2832$$
$$P = .00062$$

which means that in 62 out of 10,000 chances we should get in random sampling a fit as bad or worse in the same direction. Accordingly, we

[6] Fisher, R. A. *Statistical Methods for Research Workers.* (London: Oliver and Boyd, 1925), pp. 54-55.

[7] Elderton, W. Palin. "Tables for Testing Goodness of Fit." *Biometrika,* Vol. I, p. 155.

conclude that a theoretical curve fits this distribution quite unsatisfactorily. In other words, when taking these results into consideration along with the values found for skewness and kurtosis, there simply could not be a much greater departure from normality as far as these pupils are concerned. They just did not apply themselves according to the normal probability curve.

The percentages or indices from which the above data were derived show the trends in study habits. The data are classified in Table I.

TABLE I.

DISTRIBUTIONS OF PERCENTAGE OF APPLICATION OF 92 PUPILS TAKEN AT INTERVALS OF TWO MONTHS

Class Intervals	Frequency October Indices	Frequency December Indices	Frequency February Indices	Frequency April Indices
Above 97.5	0	6	16	21
92.5—97.5	8	23	21	18
87.5—92.5	21	15	12	13
82.5—87.5	13	12	7	12
77.5—82.5	9	5	5	2
72.5—77.5	8	11	9	9
67.5—72.5	10	8	9	6
62.5—67.5	6	6	6	5
57.5—62.5	4	3	6	2
52.5—57.5	6	3	1	2
47.5—52.5	4	0	0	2
42.5—47.5	3	0	0	0
Mean	76.8 ± 1.00	83.4 ± 0.86	84.7 ± 0.93	85.9 ± 0.94
σ	14.2 ± 0.71	12.3 ± 0.61	13.2 ± 0.66	13.4 ± 0.67
sk	—.73	—1.06	—1.68	—2.13
kur	—1.47	—.96	—.65	—.49
P	.0032	.0019	.0003	.0001

It is to be noted from these data that there is a constant increase in application from period to period. The mean has been raised about 9 points from October to April. The nature of the distribution has been altered also. The curve representing the distribution has been changed from one that is flat and slightly skewed in a negative direction to one that is peaked and highly skewed in the same direction. In no case, however, is there any resemblance to that which one would have in random sampling. In all probability the causation lies in the efforts made by the director to teach these pupils to "tend to business." At least there is consecutive improvement from the first intervals to the last and the mode of the April scores shows that the greatest single group of pupils is nearly 100 percent in sustained application.

Span of Application.—The data on the extent of the periods of application were obtained from the profiles made by the observers. These profiles showed the exact minutes and seconds the pupil's activity changed from distraction to application and vice versa. The type of distraction was recorded also. From these data it was found that the average span of application for the 368 profiles was 7 minutes and 32 seconds, and the average span of distraction was 27 seconds. For the different intervals, there were some variations. The October profiles revealed that these pupils had poor study habits. From this group of 92, it was found that the average spans of application and distraction were 3 minutes and 46 seconds and 1 minute and 12 seconds. These figures changed through the course of the next three intervals to spans of attention and distraction of 12 minutes and 3 seconds and 22 seconds respectively.

As to the types of distraction recorded, there were dozens of activities in which the pupils engaged aside from true concentration. Rather than enumerate all of them and their frequencies, the general types shown in Table II seem to serve satisfactorily. The data on minutes lost are included also. They were computed on the basis that the ratio found

TABLE II.

GENERAL TYPES OF DISTRACTION AND MINUTES LOST BY 92 PUPILS IN NINTH-GRADE MATHEMATICS

Type of Distraction	Number of Minutes Lost
Looking Around	32963
Visiting	24426
Waiting for Help	16647
Manipulation of Tools	15683
Leafing through Books	12589
Walking around Room	8735
Arranging Toilet	2684

under each activity remained constant throughout the year's work. This affords great opportunity for error, but it seems that it is the closest approximation that may be obtained relative to the amount of time lost by these pupils. Merely looking around seems to occupy the first rank with 549 hours and 23 minutes wasted. At the other extreme, a number of girls and a few boys seem to be sufficiently interested in their appearance to have wasted 44 hours and 44 minutes.

Inter-relationships between Application, Achievement, and Intelligence.—The general practice of placing importance upon intelligence and application as principal factors in the successful pursuit of knowledge suggests the desirability of determining the relationships between these factors and achievement. In order to find these relationships, ade-

quate measurements of the factors involved must be had. Achievement in this study is determined by finding the differences between the September and June scores made on the Reeve General Mathematics Composite Scale.[8] Intelligence is designated as the median IQ resulting from the administration of the (1) Terman Group Test, Form A, (2) Miller Mental Ability Test, Form A, (3) Army Alpha, Form 8, (4) Pressey Senior Classification, Form A, and (5) Haggerty Delta 2. These data are shown in Figure I and Figure II respectively. Zero order correlations produce the following results:

Application—Achievement	$.576 \pm .05$
Intelligence—Achievement	$.236 \pm .07$
Application—Intelligence	$.271 \pm .07$

From these findings it is to be noted that the relationship between application and achievement seems to be the only one that may be considered noteworthy. The remaining ones are too small and their probable errors too great to render their significance determinable. The matter of interpretation of these results can only be a supposition. It may lie in the teaching procedure which was of the mastery type, or it may be due to the method of measuring achievement. At any rate, whatever be the causation, the fact remains that application has more to do with achievement than does intelligence. This conclusion is supported by the results obtained from the computation of the partial correlations. Thus,

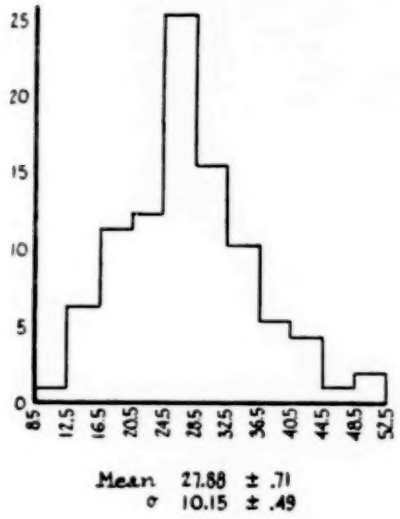
$$r_{\text{App Ach . Int}} = .548$$
$$r_{\text{Int Ach . App}} = .105$$
$$r_{\text{App Int . Ach}} = .170$$

That is, if each pupil had the same intelligence, there would be little difference in the correspondence between application and achievement. Furthermore, when the effect of application is partialed out of the relationship between intelligence and achievement, we find the quantity representing that relationship reduced by more than half.

Sex Differences Related.—The question of the relationship between the different sexes and application arises. This relationship is expressable in terms of the bi-serial r. It is a coefficient of correlation in which there is an interpretation similar to that of an ordinary r. As it is used here, it expresses the relationship between being a boy rather than a

[8] Reeve, W. D. *A Diagnostic Study of the Teaching Problems in High-School Mathematics.* (Boston: Ginn and Company, 1926), pp. 85-100.

FIGURE III. ACHIEVEMENT SCORES OF 92 PUPILS IN NINTH-GRADE GENERAL MATHEMATICS



girl and exercising a greater degree of application (or poorer) than at least one-half of the total group. The formula for the computation of this r is

$$r_{bs} = \frac{(M_1 - M_t)\,N}{\sigma_t\, z};$$

M_t represents the mean of the total population, M_1 the mean of the girls, σ_t the sigma of the total population, N the percentage of girls, and z represents a value corresponding to the value of $\frac{1}{2}\,(1 + a)$ for the value of N. The computations produce a bi-serial r of .186 with a standard error of .18. Since the error here is as great as the coefficient, the only interpretation permissible is that there is a slight relationship which may be a matter of pure chance. Consequently, no statement can be made as a basis for generalizations.

SUMMARY

The findings presented in the foregoing pages seem to suggest the following conclusions:

(1) These pupils were 82.3 percent efficient when application is compared with working time. The curve representing the distribution of scores is slightly flat and negatively skewed as shown by the skewness

and kurtosis constants, and the departure from normality as measured by X^2 and P is approximately a maximum.

(2) The Index of application increased about 9 points on the average and the nature of the distribution changed more or less significantly as the interval of time from October to April elapsed. The curve representing the distribution changed from one that was flat and slightly skewed in a negative direction to one that was peaked with the shoulders somewhat filled out and highly skewed in the same direction.

(3) Application and achievement showed a positive relationship of .576 which is significantly greater than the relationship between either achievement and intelligence or application and intelligence.

(4) As measured by the bi-serial r, there seems to be a small positive relationship between sex and application. The boys are favored slightly which, as interpreted from the size of the error, may be due to pure chance.

EDITORIALS

STATISTICS FOR EDUCATIONAL WORKERS

With the development of scientific method and with its meticulous measurement and records it became necessary to utilize mathematics, as never before, as a means to an end. That end was the understanding of quantities of data through measures of central tendency and relationship. Education as one of the youngest of the sciences has only within the last few years found numerical values significant in the solution of its problems. The application of statistics to educational research has made possible a definiteness of meaning quite at variance from the descriptive terms used at an earlier date.

It may be definitely charged that educational workers, with their enthusiasm for the new toy committed unpardonable sins in the use of statistics and in the conclusions reached therewith. As Buckingham has so ably pointed out, statistics furnish us data with which to think, but cannot be a substitute for thinking. Courtis has said on more than one occasion, that "a test tests what it tests under the conditions of the testing". So it may be said of statistics that they show what they show in terms of the conditions under which they are gathered and the manner in which they are used. We have frequently sinned by drawing conclusions that went far beyond the purposes of the test, or the use for which our statistical procedure was intended.

Previous to the development of standardized tests about the only statistical term with which teachers were familiar was the average or arithmetical mean which was used in their monthly report of school attendance. With the advent of standardized tests have come a whole volume of statistical terms. Dr. Tyler has shown clearly what the terms are which one needs if he is to be able to read educational publications at the present time.

In the training of our students to be educational workers it seems clear that there are at least three levels of need for statistical training. There is the need of teachers and supervisors who must be able to think quantitatively and to utilize the results of experimentation in classroom situations. Then there is the need of administrative groups who, in addition to understanding quantitative measures for their application to specific classroom wants, also need skill in the use of statistics for administrative purposes. Similarly, there are the research specialists who necessarily should know statistics in terms of both of these groups and in addition should be creative in finding new ways to secure quantitative results and new means for their interpretation. These differences

in need may be illustrated much better by an inclined plane than by a stairway. There is no fixed gulf between one and the other. As long as each of the groups keep clearly in mind their own functions it will not have serious difficulty in discovering the statistics it should have.

For want of better terms I am suggesting that teachers and supervisors want *applied* statistics; administrators, *interpretative* statistics; and research specialists, *creative* statistics. I have no doubt that teachers and supervisors will apply their statistics more effectively if they appreciate the significance of interpretative statistics. I am sure that administrators need to thoroughly understand applied statistics and they will probably be helped in interpretation by some acquaintance with the creative phase. The research specialist who makes his research function through the administrators, supervisors, and teachers must understand especially well both the applied and the interpretative phases, but it is his responsibility, more definitely than either of the others, to find new ways in which statistics may be utilized in educational work.

I am quite certain that the statistic courses in our teacher training institutions should be organized from this point of view. The elementary course for teachers should have those phases of statistics which will enable the teacher to understand, use, and appreciate the measures of central tendency and variability. They should sufficiently know the significance and measures of validity and reliability to enable them to select wisely their measuring instruments. They need a working knowledge of the former factors and an appreciation of the latter. As a tool in their own work it will be seldom that they will wish to compute coefficients of validity, reliability, and correlation.

In similar manner, the simpler tools of statistics should be skillfully handled by the administrative group. They should also understand measures of relationship and their significance. There is value in multiple and partial correlation as instruments but their meaning should be thoroughly understood by these workers. The research specialist, on the other hand, should have a working acquaintance with the statistics which will enable him to utilize every statistical device and principle in gaining a new understanding of educational problems. A few teachers will want to carry their statistical training considerably farther than the limits indicated. But few administrators will be desirous of making their own the statistical instruments of the research specialist.

Anyone who has followed the educational literature in recent years will have noted how frequently statistical procedures have been criticized because those used were either not the most convenient or the most applicable, or perhaps because they were quite inappropriate for the problem involved. It will be especially helpful, if in our training courses emphasis is placed upon the use and value of the various statistical procedures which are taught. On the other hand, real service will be rendered to all educational workers if writers on educational topics will make fewer assumptions regarding the acquaintance which their readers

have with statistical procedures and clarify their work so that all may understand.

Statistics have become a fetish in many quarters. In many of our great schools of education one scarcely dares present a term paper or a master's thesis, much less a doctor's dissertation without extensive use of all the statistical instruments taught in the institution. It often results in the refinement of procedures far beyond the values which can be obtained from the data involved. In practically all cases such papers or theses must be rewritten to make them understandable by the reading public. Frequently the revised form represents no loss in significance or accuracy.

I am not pleading for a return to the good old days of qualitative descriptive usage. I am not opposing the use of statistics as a means to an end. In fact I am advocating this point of view, that statistics must be a means to an end, and not an end in itself in the field of education. I am quite cognizant of the fact that educational workers must have an acquaintance with statistics. I am not convinced that teachers and supervisors require as a tool much of the statistics that are often taught in our courses. I thoroughly believe that there is greater need for an understanding and appreciation of the significance of statistics than for the development of skill in the use of many formulae.

E. J. A.

REVIEWS

Address all communications relative to book reviews to Editor E. J. Ashbaugh, Miami University, Oxford, Ohio.

LEAL, MARY A. *Physiological Maturity in Relation to Certain Characteristics of Boys and Girls.* Philadelphia: University of Pennsylvania, 1929; 118 pp.

This study by a candidate for the doctorate in the School of Education of the University of Pennsylvania deserves both the adjectives scientific and valuable. It shows clearly defined problems of practical import, adequate knowledge of related literature, large samplings, careful appraisal of the data, appropriateness of statistical techniques, thorough analysis and interpretation, restraint in conclusions, and complete and clever presentation. Miss Leal examined the records of over 4,000 school children in Grades 4 to 12 in the schools of New Britain, Connecticut, in order to see (1) "how children of each stage mature year by year so far as this can be judged by an examination of a distribution according to chronological age; (2) how children of each stage progress through school so far as this can be judged by their distribution according to age-grade groups, IQ's, and in some cases teachers' marks; and (3) how children of each stage differ in personality so far as this can be judged by their distribution according to their exhibition of traits in connection with their IQ's."

Maturity stages were determined by physicians in accordance with the criteria "that are generally accepted by the more recent investigators in this field." Their application gave four stages of physiological age for boys and three for girls. The second of the stages for boys was identified in those cases where the eruption of the second molar teeth was not associated with any other sign of maturing. These boys are usually regarded in the study as properly belonging to the next stage identified, the pubescent. Correlation throughout the study has been represented by Q, the coefficient of association, which reveals trends only. Partial correlation techniques have been avoided by sampling.

The more important of the findings in the first part of the study are: (1) a small difference between boys and girls in median ages of maturing—the girls only 7 months earlier than the boys; (2) earlier maturing in general for these children than those of previous reports—only 7 percent of boys and 5 percent of girls immature at 13 years of age; (3) duration of maturing period for girls uneven but averaging 3 years; boys from 2 to 4 years; (4) no clear relationship between earlier maturing and higher IQ; (5) surprising amount of early maturing in the grades; (7) in general the more mature children of any CA showing greater percent of underageness and smaller percent of overageness; and (8) little evidence that mental age keeps pace with physiological age rather than with chronological age.

The latter part of the study, dealing with personality traits and physiological maturity, is significant for its list of

traits, the isolation of factors by sampling, and various ingenious tables and figures for displaying very complicated data. Admittedly, however, there are too many crudities and too great reductions of the data in many instances to permit strong conclusions. The author does venture the following as the most secure of her findings here: (1) There is little evidence of distinctively "adolescent traits," except for "evidence of religious awakening among boys" and gregariousness among girls. (2) Certain traits, however, do stand out as characteristic of children in one stage rather than another. (3) While some traits show independence of IQ, many appear to be associated in some way with it. (4) Chronological age and grade seems to be closely associated with some traits, whose appearance, therefore, may be due to social experience.

The students of physiological maturity in relation to chronological age, IQ, school progress, and personality traits are still far from the end of the road. They are working on problems, however, of such importance to educational administration, curriculum construction, and teaching method that their output is of the greatest interest to school people. Miss Leal's study promises to take its place among the half dozen most significant major investigations in the field.

M. H. WILLING

University of Wisconsin

ALEXANDER, U. S. *Special Legislation Affecting Public Schools.* New York: Teachers College, Columbia University, 1929. vi + 141 pp.

Students of municipal government have long been familiar with the fact that, in spite of constitutional prohibitions, much special municipal legislation has found its way into the statute books of every state. It is not, therefore, surprising to learn from this study that much the same situation exists with reference to school legislation.

The author of this dissertation has recorded in detail the special school legislation of the states of New York, Pennsylvania, Ohio, North Carolina and Florida, and at the same time has made an extensive investigation of the special school legislation in the other states.

The author defines his problem as follows:

1. To discover the influences which have led to the origin, development, and present utilization of special school legislation.

2. To investigate the advantages and disadvantages of such legislation.

3. To suggest solutions if possible to the problems of special legislation affecting public schools.

He points out that in spite of the fact that the great majority of states prohibit or restrict special legislation by constitutional provision, ingenious expedients nevertheless are resorted to in order to evade the spirit of the constitution while seeming to conform to the letter of the law. The chief means of evading constitutional prohibitions on special legislation has been by means of classification, usually by population, but also frequently by descriptions. Classifications are often ridiculous to say the least, such as the one in New York state which applied to all localities having a waterfall over one hundred feet high. Such legislation being introduced by the words: "Any school corporation" is supposed to be less objectionable than if Niagara Falls had been named outright. Classifications by population are equally objectionable where it is apparent that only one city can possibly be listed in the class. Much of such special legislation goes uncon-

tested, thus encouraging future legislative bodies to resort to the same expedients.

The reason for the large amount of special school legislation is attributed to the lack of a satisfactory general law, but even in states where a fairly satisfactory general law exists, differences in population and wealth seem to require some special legislation for the schools as well as for the city government. The author finds that special school legislation is on the decline in those states that have passed adequate general school laws or school codes, and in which reasonable classifications have been made to meet the needs of the larger schools. He points to the states of Tennessee, North Carolina, South Carolina and Florida as those which still enact special school legislation in most significant quantities. The reasons for the excess of special legislation in these states he attributes to the lack of centralized and stabilized state control, as well as to the incomplete nature of many of the early general laws.

He concludes that the methods which are most effective in the abolition of special school laws are: (1) constitutional restrictions; (2) adequate classifications; (3) broader and more adequate general legislation; and (4) the delegation of increased administrative and judicial powers to state educational bodies and officials.

The school as a governmental unit has been neglected by political scientists, and studies like this one are welcome additions to the interesting and expanding field of school government and law.

FRANK EDWARD HORACK
State University of Iowa

DOUGHERTY, MARY LORETTE. ***The Educational Clinic of the Department of Education.*** Baltimore: Johns Hopkins Press, 1929. viii + 78 pp.

This study includes a number of cases considered representative of the type of problems presented at the Educational Clinic at Johns Hopkins University. This clinic service, in operation since 1923, has been free to parents and teachers who are faced with children problems which can best be handled by the clinician.

Section 1 includes two case studies of children who are maladjusted in school and at home, and Section 2 includes three cases of speech defects.

Complete case histories and also the results of remedial treatment to date of publication have been obtained. These cases are rather typical of the problems which a regular classroom teacher may encounter.

The section on reading difficulty is composed of two case studies of non-readers with the remedial procedures used. One case is presented very much in detail in order to illustrate the methods used. This section is particularly valuable for primary teachers who have children with the ability to read, and yet who do not seem to make much headway with it.

The section on school acceleration is representative of a problem which confronts most superintendents and teachers. Three interesting cases of acceleration are pictured. All of these cases were advanced beyond their grade and they succeeded. This is not an indication that all bright children would succeed, but it does show that an exceedingly careful analysis of the problem by the clinic was made before the children were advanced.

A number of questions of school placement arise in the four cases presented.

They illustrate the value of standardized educational and mental examinations, supplemented by expert clinical observation and interpretation.

Other cases illustrate the questions of misbehavior as a sign of school maladjustment, and how far a child may progress in school.

The case studies are quite complete and show evidence of a great deal of objective study. Both verbal and motor tests were administered. In case of lack of academic progress, however, strictly nonverbal tests or mechanical-aptitude tests would have aided in diagnosing the difficulty. This would apply especially to cases number 22 and 23 since they may have had motor aptitude in advance of their language development.

Case 22 presents the problem of a boy who had never learned to read. When first examined by the Stanford-Binet, his IQ was 84, but after learning to read, it became 101. This was merely explained by reading ability. It seems that this change in IQ may signify a change in attitude which accompanies the process of learning to read rather than being caused by it, since there are only three tests in the Stanford-Binet requiring reading ability. These count a maximum of nine months and will not change the IQ of a boy his age more than five points.

In general, these case studies are particularly valuable as examples of the cases handled by such a clinic and of the great service such a clinic may be in serving the home and school and especially the child. This study is very valuable for teachers, supervisors, and clinicians as an example of how to handle individual problems.

HELEN L. MANSFIELD
Miami University

BAKER, HARRY J. ***Educational Disability and Case Studies in Remedial Teaching.*** Bloomington, Illinois: Public School Publishing Company, 1929. x + 172 pp.

One of the major difficulties with which school administrators have to deal is the problem of providing and organizing adequate instructional facilities for pupils who do not make normal educational progress. Fortunately, this problem has been subjected to experimental study by Professor Harry J. Baker, clinical psychologist in the Detroit public schools. The description and results of the study are incorporated in the book which forms the basis for this review.

The first step in the investigation consisted in the selection of pupils with special educational defects. Considerable care was exercised in the selection of cases. The pupils that were finally selected for coaching were chosen from among the 894 nine-year-old pupils who were enrolled in seven Detroit elementary schools. These particular schools were used because they satisfied the criteria of average intelligence and average social status of their pupils. The study was limited to nine-year-old children in order to insure an age-group most of whose pupils would be enrolled in the first six grades of the elementary school. In view of the care which had been exercised in the choice of pupils up to this point, one is surprised to find that final marks for one semester were made the sole criterion for the determination of educational disability. On this basis, the sixty who had been conditioned or failed in the subjects of arithmetic, spelling, reading, and handwriting were selected as coaching cases. "Educational tests were not considered as means of selection on account of the number needed and the number of pupils to be examined." Because of the unreliability of teachers' marks, one may well entertain serious doubts regarding their

validity as means of selecting pupils who are educationally disabled.

The second step of the study consisted in diagnosing the coaching of the pupils in order to discover causes of educational disability. The diagnosis involved three groups of factors: personal and social, educational, and mental. The influence of personal and social factors was discovered by means of a survey of home conditions, and by means of a detailed examination to discover physical defects and personality traits that might be inimical to educational progress. The mental and educational factors were diagnosed by means of a series of mental and educational tests. Considerable use was made of special ability tests in order to get a check on the pupil's mental processes.

Remediation of educational defects comprised the third phase of the experiment. To compensate for their lack of special training in remedial teaching, the three coaching teachers met in consultation with Professor Baker one afternoon per week during which the work was in progress. The pupils in the coaching group "were assigned to the coaching for two periods per week of thirty minutes each, in each subject in which coaching was necessary."

The final step in the experiment consisted in measuring the effects of coaching. For this purpose, Form B of the Stanford Achievement Test was used; Form A had been used for the initial testing. The technique of remediation consisted, in the main, in diagnosing the pupils for specific educational deficiencies in the subject fields in which they manifested disability, and in individualized remedial instruction for overcoming the deficiencies thus discovered.

The results obtained are significant. Seven months of improvement in general educational age were gained in four months' time. Forty-nine percent of the cases coached in arithmetic raised their marks to a satisfactory standard. All cases coached in handwriting made satisfactory improvement. "In all subjects, 40 restorations out of 89 disabilities, or 44.9 percent were achieved." Restoration was least satisfactory in reading and spelling.

The case studies reported in Part IV of the monograph are especially illuminating. They are of particular value to teachers and supervisors along two lines. First, they reveal the extent to which educational disability is due to personal and social, as well as to educational and mental factors. Second, they show that many cases of disability can be corrected by means of a program of individual diagnosis and remediation.

The volume contains many suggestions that should be of especial interest to the school administrator who is concerned with the problem of organizing and administering a restoration program for the five or ten percent of the school population who, in greater or less degree, have become the victims of educational maladjustment.

Miami University WALTER S. GUILER

DYDE, W. F. *Public Secondary Education in Canada.* New York: Teachers College, Columbia University, 1929. 263 pp.

The field of comparative education has not received much study from students of education in this country. The output of professional research in education has been increasing rapidly, but only a very small portion of it has been devoted to studies of the school systems in other countries. The studies that have been made have dealt, on the whole, with the historical accounts of the various countries and with little effort directed toward

a scientific analysis of the distinguishing characteristics of the different levels of education maintained.

In this study, Professor Dyde has analyzed a number of factors in the secondary schools of Canada, and from such analysis has deduced certain broad generalizations which are embodied in the Canadian school system as a whole and are particularly applicable to education on the secondary level. A paraphrasing of the important characteristics of the Canadian educational system are:

1. Although Canada has nine provinces, representing as many separate educational units, the study shows that the similarity in aims and methods justifies the statement that there exists a Canadian system of secondary education.

2. A second characteristic of provincial administration of secondary schools is centralization of control. This tendency is evidenced by the close coöperation which exists between the provincial departments of education and the normal schools in the matter of entrance requirements and matriculation examinations.

3. A third characteristic is that the Canadian secondary school system is rapidly developing under pioneer conditions of life. This tendency is observed most clearly by the large number of small high schools scattered over a wide area of unsettled country.

4. Finally, the secondary schools of Canada are in process of democratization. There is no doubt that the Canadian school system has been indirectly influenced by the methods and practices of the United States.

The book contains twelve chapters and deals with such problems as high-school population, articulation with elementary and higher schools, training of teachers, and the curriculum. The author has drawn freely from original documents, reports, and bulletins issued by the departments of education in the provinces. He has also utilized the results obtained from an extensive questionnaire sent to representative superintendents and principals throughout Canada. The author may be criticized for including some materials bearing on certain phases of secondary education and excluding others. For example, the problem of financial support of the secondary school has been purposely omitted from the discussion, the aim being to select only those materials which would best characterize the Canadian system of secondary education.

The book should prove interesting and valuable to all students of education, and especially to those working in the field of comparative and foreign education.

ROBERT A. DAVIS
University of Colorado

MELVIN, A. GORDON. *Progressive Teaching.* New York: D. Appleton & Company, 1929. xii + 272 pp.

This is an exceptionally well-written book in which the author endeavors to present to classroom teachers the scientific foundations of modern teaching. He has sensed the need for translating educational psychology, philosophy, and sociology to classroom practice. To state that he has been entirely successful would be an exaggeration, but he has made a valuable contribution in that he has made it possible for teachers to realize more clearly how modern teaching may be accomplished.

The book is not too technical for use by normal school graduates and by college graduates with a reasonable background of work in psychology and education. It is especially recommended for study by teachers in service who desire guidance in the application of modern educational theory to the solution of class-

room problems. It should prove to be a valuable textbook for use in teacher-training institutions.

ALONZO F. MYERS
Connecticut State Board of Education

CLOUSER-MILLIKAN. ***Kindergarten Primary Activities Based on Community Life.*** New York: Macmillan Company, 1929. viii + 299 pp.

This book meets the needs of both teachers and laymen for concrete units of community life activities in the lower elementary school. The first two chapters present guiding principles underlying the selection of curriculum content, and the objectives of a curriculum based on social studies. The next four chapters describe concrete units of activities for the kindergarten and the first three grades. The last chapter consists of a suggestive list of other possible units.

The strength of the book lies in the union of modern educational theory and practice. The units illustrate in a practical way the philosophy that school is life today as well as a preparation for life tomorrow. The teachers do not blindly follow the natural interests of children but select worthy ones that lead onward into new channels. The described activities provide many rich and varied experiences with the physical, social, and economic worlds from which the content of social studies is drawn. The tools of experience, such as reading, writing, and arithmetic, grow out of needs arising in these experiences. There is provision for the aesthetic interpretations of life, not only through contact with the beautiful but also through creative expression.

The authors recognize the need for sequential organization, making neither geography, history nor civics the core, but childgrowth. Beginning with present interests they lead the children back to the past through curiosity, then up to the present. Comparisons are constantly made.

The kindergarten units, The Airplane and The Park, do not seem to fit into this sequential organization. It begins in the first grade with a home unit, widens into community units, and as a means of helping children to understand the complicated life of today, reaches back into Indian and Pioneer life. The final units compare the local community with foreign communities, through child life in other lands. I do not agree with the authors that children should study few peoples, because inductions about contemporary life come from detailed experiences with many peoples. Lack of time necessitates selection, but not the limitation of the selection to two or three peoples.

Unfortunately the authors describe the worn out unit of Holland life. The Dutch twins, Kit and Kat, are not truly representative of children in Holland today, although their quaint costumes do make attractive blackboard and sand-table decorations. In a few places children do compare with these story book characters but in these places they are exploited for the sake of tourists' coin.

Perhaps this book would be of greater help to unbelieving laymen and to teachers of traditional subject matter if each unit had charts showing more definite outcomes of activities in terms of the conventional subjects. The stated outcomes are too general, for example, on page 180 I find spelling outcomes for the second grade stated as "Words needed for writing letters, invitations, ————." A definite chart showing the exact words that the children used, these words classified and compared with a standardized

list, would remove all doubts concerning spelling outcomes.

MARY WILLCOCKSON
Miami University

O'SHEA, M. V. ***Newer Ways for Children.*** **New York: Greenberg, 1929. ix + 419 pp.**

This book consists of three parts: Part I, New Times Bring New Problems; Part II, Each According to His Nature and His Needs; and Part III, Adjusting Natural Trends to Present-Day Conditions.

In Part I, the author succinctly points out the changed conditions of living that confront the modern parent and child. He deals rather sympathetically and probably quite justly with the undesirable traits of children of this generation. The rôle that an overstimulating and exciting environment plays in bringing about the many present-day maladjustments of children is forcibly portrayed by many apt illustrations.

In Part II the author discusses specifically many of the typical problems confronting parents and teachers. Some of these crucial problems are: Headstrong children, "lazy" children, irresponsible children, the time-waster, jealousy in childhood, the habit of failure, the habit of "talking-back," gifted children, and backward children.

In Part III, the author seeks to set up a constructive or remedial program. In the twenty-three chapters therein he discusses certain natural urges of children that must be intelligently nurtured if a poised personality is to result.

Before one can make a just appraisal of a book, he must consider the author's aims. In "Explanatory" (preface), the author states, "This book is designed mainly for parents, teachers, and social workers who are immediately responsible for the care and training of children. . . . . Parents and teachers are interested primarily in guidance and not in scientific data or principles as such." In the light of the purposes set forth above one must say that a very commendable piece of work has been done. The eighty chapters are devoted to a consideration of many typical and crucial life situations and problems incident to the home and school life of children. The discussion reveals that the author has a wide knowledge of these problems. His application of deductions from recent research studies pertinent to child nature is especially well done in many instances.

But is the author correct in his contention that "Parents and teachers are interested primarily in guidance and not in scientific data or principles as such?" Even if his assumption is correct, does it follow that parents and teachers should be denied a concise presentation of those scientific principles whose use and misuse vitally affect the physical and psychical development of childhood? Does not the omission of the fundamental laws and principles upon which certain methods and devices are based tend to assume that teachers and parents are mere followers, blind practitioners, and entirely dependent for their procedure upon such specific suggestions as are set forth in this book? Parents and teachers who are interested enough to read "Newer Ways with Children" could probably appreciate the several laws upon which the methods are based.

The book, however, will prove a boon to many busy and earnest parents who will find in its many chapters wholesome guidance for many of their perplexing problems with children. And this, after all, was the primary purpose of the author.

C. L. GERMANE
University of Missouri

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Address all communications relative to research abstracts and bibliographies to Editor A. S. Barr, University of Wisconsin, Madison, Wisconsin.

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A discussion in which the author concludes that occupational distribution is

correct when people of equal ability receive equal wages in all occupations. The author presents a series of such summary statements.

GUILER, WALTER SCRIBNER. "Improving Ability in Spelling," *Elementary School Journal*, XXX, (April, 1930), 594-603.

A report of an objective study of the improvement of the spelling ability of fifth grade pupils made in the Bellbrook Public Schools, Ohio, 1928-29. The instructional procedure was built around words and parts of words that presented special difficulties.

HEIGES, J. S. "How Many and What Subjects Should a High-School Teacher in Pennsylvania Be Prepared to Teach?" *School Review*, XXXVIII, (April, 1930), 286-299.

The data are based on returns from 867 high schools and 8,197 teachers. In the four year high schools, teachers need to prepare to teach not more than two subjects; in three year high schools, teachers need to prepare to teach three subjects and in some cases four subjects.

HURD, A. W. "High-School Physics Makes Small Contribution to College Physics," *School and Society*, XXXI, (April 5, 1930), 468-470.

A statistical analysis showing that high-school physics makes but small contribution to college physics.

KEFAUVER, GRAYSON N., AND SCOTT, ROBERT E. "The Home Room in the Administration of Secondary Schools," *Teachers College Record*, XXXI, (April, 1930), 624-641.

A questionnaire study of home room practices including such matters as time available for home room activities, distribution of pupils to home rooms, responsibility for the program, the general nature of activities, etc.

KOCH, HARLAN C. "Some Aspects of the Department Headship in Secondary Schools," *School Review*, XXXVIII, (April, 1930), 263-275.

The data were secured from superintendents, principals, and department heads, representing 171 high schools, and include such matters as arguments for and against the headship, qualifications for the position, departmental enrollments, cost, professional training, experience, etc.

WAGENHORST, L. H. "The Relation Between Ratings of Student-Teachers in College and Success in First Year of Teaching," *Educational Administration and Supervision*, XVI, (April, 1930), 249-253.

The study is based upon the records of 243 graduates from the State Teachers College, Slippery Rock, Pennsylvania, 1927-28, and 191 ratings from superintendents. The coefficients of correlation were: practice teaching rating and first year of service rating $+.23 \pm .05$; intelligence (Otis) and first year of service rating .....$+.001 \pm .05$; and scholarship (quality points) and first year of service rating.....$+.01 \pm .06$.

EXPERIMENTAL STUDIES OF TEACHING AND LEARNING

BLANK, IRENE R. "An Experiment in Directing Thinking in Physics," University of Pittsburgh, *School of Education Journal*, V, (March, 1930), 90-96.

An experiment of the use of a study guide in four physics classes in the

Dormont High School, Pennsylvania, two during the second semester of 1926-1927, and two during the second semester of 1927-1928. The results favor the study guide method.

FREEBLE, CHARLES R. "An Experiment in Directing Thinking in Modern European History," University of Pittsburgh, *School of Education Journal*, V, (March, 1930), 97-100.

A comparative study of the contract method and a study guide procedure conducted with two groups of tenth year students in the Ambridge, Pennsylvania, Senior High School, 1928-1929. The study guide technique is shown to be superior.

GRAY, WILLIAM HENRY. "An Experimental Comparison of the Movements in Manuscript Writing and Cursive Writing," *Journal of Educational Psychology*, XXI, (April, 1930), 259-272.

An intensive study of the handwriting movement in manuscript writing and cursive writing. Writers were found to differ chiefly in the speed with which movements are made in writing letters. No significant differences were found between manuscript writing and cursive writing in the manner of grasping the pen, in the movement of the hand within words, in the method of moving the hand and arm along the line, or in the combination of hand movements, arm movements and finger movements executed in making the letter strokes.

HURD, A. W. "What Are Girls and Boys Getting from Their School Courses in Science?" *Teachers College Record*, XXXI, (April, 1930), 642-647.

A summary of results gained from twelve objective tests given to different pupils during the school year of 1928-29. The mean gain per test was 32.1 percent. The results also showed considerable group and pupil variation.

KRUEGER, WILLIAM C. F. "Further Studies in Overlearning," *Journal of Experimental Psychology*, XIII, (April, 1930), 152-163.

An intensive study of the effects of overlearning. The author concludes that overlearning affects retention, and that the increase from 100 percent to 200 percent overlearning is not as economical as 50 percent to 100 percent overlearning.

PEASE, GLENN R. "Should Teachers Give Warning of Tests and Examinations?" *Journal of Educational Psychology*, XXI, (April, 1930), 273-277.

A comparative study of two groups of 204 subjects each in which announced and unannounced examinations were used. It would appear from the data that the value of cramming is in direct proportion to the intelligence of the one doing the cramming. Something like a quarter to a half of the advantage gained by cramming is retained for six weeks, but only about one-eighth of it is retained at the end of twelve weeks. The author believes that teachers should give warning of tests.

TABER, GERTRUDE J. "A Study of Errors in First Year Latin," University of Pittsburgh, *School of Education Journal*, V, (March, 1930), 101-108.

One thousand thirty-nine errors were collected by means of five objective tests given to ninth grade pupils in the Cochran Junior High School, Johnstown, Pennsylvania. The most difficult steps

in the translation process were the Latin infinitives, the accusative case as the subject of the infinitive, and tense and voice in indirect statements.

CURRICULUM CONSTRUCTION

TYLER, R. W. "Evaluating the Importance of Teachers' Activities," *Educational Administration and Supervision*, XVI, (April, 1930), 287-292.

A critical discussion of the activity analysis method in curriculum instruction with statistical evidence bearing upon the amount of agreement between the ratings of specific activity by philosophers and teachers.

STATISTICS

CURETON, E. E., AND DUNLAP, J. W. "Spearman's Correction for Attenuation and its Probable Error," *American Journal of Psychology*, XLII, (April, 1930), 235-245.

An examination of the assumptions underlying the various formulas proposed for estimating the true correlation between variables measured by fallible observations, and the probable error of such formulas.

TYLER, R. W. "Statistics Needed by Readers," *Educational Research Bulletin*, No. 8. Columbus, Ohio: College of Education, Ohio State University, IX, (April 16, 1930), 205-211.

The author presents a list of statistical terms and problems based upon analyses of articles appearing in recent periodical literature.

TESTS AND MEASUREMENTS

CATTELL, PSYCHE. "Comparability of IQ's Obtained from Different Tests at Different IQ Levels," *School and Society*, XXXI, (March 29, 1930), 437-442.

The data, based on the records of 322 children who had taken from one to three tests, (fifteen in all), for a period of years, were used as the basis for this investigation. The author warns against the use of medians and reliability coefficients as the sole basis for judging the reliability of a test, and against the errors that may result from using IQ's obtained from different tests or at different ages as equivalents. To obtain a single IQ for a child and allow this to suffice for the whole school period may result in serious injustice to the child.

THURSTONE, L. L., AND THURSTONE, T. G. "The 1929 Psychological Examination," American Council on Education, Washington: *Educational Record*, XI, (April, 1930), 101-128.

A list of colleges submitting records on the 1929 examination with scores, percentile ranks, and other statistical data.

WHEATLEY, B. W., AND DAVIS, R. A. "The Teacher's Use of Objective Examinations," *Educational Method*, IX, (April, 1930), 420-427.

A questionnaire study based upon 158 replies from students in attendance at the University of Colorado summer session of 1928. The author concludes that high-school teachers consider the ability to produce or use information as the most important single factor in school marks, that high-school teachers use objective examinations which they know to be reliable in 33 percent of the cases, and that objective methods influence the final mark about 17 percent.

NEW TESTS

CLAPP, FRANK L., AND YOUNG, ROBERT V. *The Clapp-Young Self-Marking Tests.* Boston: Houghton Mifflin Company, 1930.

An announcement of a series of self-marking tests in English, Reading, Arithmetic, etc.

JONES, LONZO. *Shall I Go to College?* Bloomington, Illinois: Public School Publishing Company, 1930.

A self-rating scale of the characteristics required for success in college.

LENNES, N. J. *Lennes Test and Practice Sheets in Arithmetic,* (New Edition). Chicago: Laidlaw Brothers, 1930.

OTIS, A. S., AND ORLEANS, J. S. *Manual for Transmuting Standardized Test Scores into Terms of School Marks.* Yonkers-on-Hudson, New York: World Book Company, 1930.

A method for transmuting standardized test scores into letter grades or percents.

POWERS, FRANCIS F. *Powers Diagnostic Latin Test.* Bloomington, Illinois: Public School Publishing Company, 1930.

This test measures the extent to which pupils in first-year Latin have mastered the vocabulary, word forms, and translating skills necessary for this subject.

MISCELLANEOUS STUDIES

BARNARD, RAYMOND H. "The Relation of Intelligence and Personality to Speech Defects," *Elementary School Journal,* XXX, (April, 1930), 604-620.

A summary of investigations dealing with the relation of intelligence and personality to speech defects. Low intelligence is a symptom, rather than a cause, of speech defects. Personality traits are more enlightening than intelligence in the study of speech defects, since they point to emotional difficulties as the source of stuttering and kindred speech defects.

CLUGSTON, HERBERT A., AND DAVIS, ROBERT A. "Is a Scientific Method Possible for Philosophical Research in Education?" *Educational Administration and Supervision,* XVI, (April, 1930), 293-299.

A discussion of the content and method of philosophical research.

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Editor V. T. Thayer, Ethical Culture Schools, 33 Central Park West, New York City.

Character Education Discussion Conference

At the time of the dedication of the new School of Education Building at New York University, the Elementary Education Department sponsored a Character Education Discussion Conference. Some sixty of America's outstanding educators interested in the problems of character and elementary education, met for a period of three hours to consider the present status and major problems of character education.

The program centered around five major problems, each under the general direction of a discussion leader. The major units of discussion and the respective leaders of the discussion were as follows:

Elements of Character, Dr. Henry Neumann, Leader, Brooklyn Society For Ethical Culture; Problems of Method in Character Education, Professor Edwin D. Starbuck, University of Iowa; Curriculum Aspects of Character Education, Professor W. W. Charters, Ohio State University; Scientific and Testing Approach to Character Problems, Professor Hugh Hartshorne, Yale University; and Teacher Training and Character Education, Professor Goodwin B. Watson, Teachers College, Columbia University.

As a basis for the discussion, over fifty controversial issues in the field of character education were compiled and used as points of departure by those participating.

There was oneness of mind on the general problem of method in character education. The so-called direct method is being discarded. This does not, however, imply the absence of a carefully worked out program. Situations, not traits, constitute the new approach. A simultaneous and coördinated program of activities in the home, community, and school is essential to effective character training.

There was likewise general agreement on the points discussed pertaining to the curriculum for character education. It was agreed that there should not be a differentiated subject with specified time and place in the routine of school life. Just as a health program it functions successfully when it permeates the entire curriculum, the entire life of the school.

The last unit of discussion pertained to training of teachers for a sound character education program. Several significant recommendations were made for preparing the teacher for this important task. Teachers must be trained in an atmosphere of freedom to think, to act, and to experience. Training in elementary clinical research for all prospective teachers was emphasized as was also a better and broader cultural and general education for an improved view of life's meanings and values. Lastly, the very timely suggestion was offered that the core of our teacher-training program should be professionalized subject matter centering around the major objectives of education, such as worthy home membership, vocational activity, citizenship, and wise use of leisure.

Dr. M'Ledge Moffett of Teachers College, Columbia University, has completed an illuminating study of the "Social Background and Activities of Teachers College Students." This is an interpretative study of the social, economic, and intellectual background of teachers college students based on an analysis of the returns from an inventory of social contacts checked by 1080 women students in 15 representative teachers colleges of the United States. The colleges used in the study are located in all sections of the country. The students are a random sampling of the student groups in these colleges.

The purpose of the study is to give a more intimate insight into the personal problems of students as a basis for planning the social and educational program of teachers colleges and to form the basis of needed life experience in the student activities of those institutions.

The average student is a good representative of the middle class of American society, who in mentality is only slightly above the average. Her father is, generally, either a manager of a small business, a skilled workman or a farmer, while her sister is a stenographer, a nurse, or a business clerk. Her chief source of pleasure is picnics, amateur plays, or basketball games, and she has never wandered more than 200 miles from the place of her birth or visited more than one large city.

Less than 2 percent of the students have no church affiliation. More than 85 percent are Protestants, 7.6 percent Roman Catholics, and 3.5 percent Jews. In the Protestant denominations the Methodists and Baptists lead, with the Episcopalians, Congregationalists and Quakers following in the order named. While, according to the survey, the average student attends church regularly she has never come in contact with the leaders of thought in the religious world.

The most significant contribution of the study is the analysis of the personal life and activities of the student, their reading habits; musical, art and dramatic appreciations; leisure time; recreations; creative activities; and the part played in the college life by organized clubs and organizations.

Temple Bailey, Gene Stratton Porter, and Charles Dickens are the authors most widely read by the students.

Thirty-one percent of the students work their way through school, and all of them spend much time on household tasks. The average student attends motion pictures and goes to church frequently, has dates with men, plays a musical instrument, likes to dance, prepares meals, goes shopping and indulges frequently in "heart-to-heart" talks with her chum.

A Formal Talk Study in Grade Four

While it is undoubtedly true that oral English is at the basis too intangible a subject for actual measurement, and while it is also true that imagination and the power of personality are so varied in nature that they elude the yardstick of material measurement, it is still essential that the science of education attempt to follow individual pupil progress in this field. To this end, the following study was completed in a one-term period covering eight classes in two schools in Philadelphia. Approximately 320 pupils of the fourth grades were involved in the study, which was conducted jointly by the two principals of these schools. There will be no attempt here to show the nature of the teacher meetings and conferences which preceded and ran parallel to the administering of the study. The principal aim of this paper, however, is to show that a study in the more or less

subjective field of oral English is helpful to the teacher, because it gives her a measure of class and pupil progress; and it is helpful to the individual pupil, because it reveals particular difficulties and provides remedial instruction.

STUDY OBJECTIVES

1. To discover the extent to which a course of study in oral English functions.
2. To give the principal a measure of teaching efficiency as evidenced by results over an approximate term period.
3. To experiment with aims in oral English in an attempt to make them definite wherever possible.
4. To devise an individual pupil form which proceeded from the beginning of each pupil's talk to the end of the criticism following this talk.
5. To make provision for diagnosis of individual shortcomings with a view to remedial teaching.
6. To provide for establishing in the mind of each pupil a tangible idea of his present status in oral English.
7. To suggest possibilities for measuring progress in oral expression in other grades by means of similar studies centering on the objectives outlined in the course of study in English for those grades.

With these general ideas in view, the aims of the particular grade were considered next. The Philadelphia English Course emphasizes the following points as objectives for the teacher of Grade IV: (a) opening sentence memorized; (b) use of connectives stressed; (c) use of colorful words or phrases; (d) use of words new to the class; and (e) closing sentence memorized. It suggests, also, that the subject matter be taken from the literature of the grade, and further suggests ways and means whereby the teacher can shape and develop the criticism which is offered by the pupils after each child has spoken. This material from the course was used as a basis for the construction of the following *Individual Pupil Record* (one for each pupil on roll):

FORMAL TALK

Date.....Grade.....Room No. ....

1. Name of Pupil.....
   No. in order of speaking.....
2. Opening Sentence Memorized (yes or no).....
3. No. of Connectives (Strokes)
4. No. of Colorful Words or Phrases (Strokes) — Accept only correct forms
5. No. of Words used correctly which are new to the class (Strokes)
6. Closing Sentence Memorized (yes or no).....
7. Rating of Teacher (E, G, F, P, VP).....

CRITICISMS

1. Favorable
2. Constructive
3. Destructive
4. General
5. Incorrect
6. Total

All of the eight teachers were instructed to use the same interpretation when considering criticism of a talk. The following will serve to illustrate how this was accomplished:

(1) *Favorable Criticism:* "I liked the talk, because John spoke loudly." (2) *Constructive Criticism:* "John said 'I seen it;' he should have said 'I saw it' (giving correction). (3) *Destructive Criticism:* "John said 'I seen it' (omitting correction). (4) *General Criticism:* "It was interesting."

METHOD

As the child spoke, the teacher, who was seated in the rear of the room, held the *Individual Pupil Record Sheet* before

her. Immediately after the first sentence of the formal talk was completed, she wrote "yes", or "no" after Number 2 of the Record Sheet, i. e., "Opening Sentence Memorized." Thereafter she used a stroke to indicate the use of connectives, Number 3; Colorful words or phrases, Number 4; and new words, Number 5. At the end of the talk she wrote "yes" or "no" after Number 6 of the Record Sheet, i. e., "Closing Sentence Memorized."

The child then went to his seat. Criticism began. The teacher called upon each upraised hand for criticism and classified the criticism as it was given.

This procedure was followed until every child in the class had given a formal talk. Naturally, the program of studies was changed temporarily so that a formal talk period could be included every day until all the children had spoken. At the end of the first round the teachers sent class summaries to the office of the principal, retaining the "Individual Pupil Record" for use in the formal talks to follow.

The first testing took place in February. In May the procedure was followed again, *precisely as in February*. Class summaries were again given to the principal. The February and May general summaries were compiled from the class summaries, and are given below as the results of the experiment. In computing the results in every case only teacher rating averages were obtained by dividing the number of the respective items scored by the number of pupils participating. Thus, under criticism results, 3.8 in February for favorable criticisms means the total number of favorable criticisms made during the February testing divided by the total number of pupils participating. In the case of teacher rating the computation is worked out in percents; 26.7 opposite E in February rating meaning that 26.7 of the pupils tested, in the opinion of the teacher, attained that grade.

CRITICISM RESULTS

	February	*May*	
Favorable	3.8	5.9	
Constructive	1.6	2.0	
Destructive	1.4	1.5	(due to increase in *total* criticism)
General	.7	.2	(almost completely eliminated)
Incorrect	1.0	1.2	(due to increase in *total* criticism)
Total	8.5	10.8	

TEACHERS RATINGS

Satisfactory	E	26.7		39.4	(about 50% increase)
	G	39.4		34.0	
	F	23.3		21.0	
Total			89.4		94.4
Unsatisfactory	P	9.3		4.8	
	V. P	1.3		.8	
Total			10.6		5.6 (almost cut in half)
			100.		100.

RESULTS

(a) *Opening* and *Closing* Sentence *Memorized*

The number of pupils who will memorize opening and closing sentences will not be greatly changed (.8 in February and .9 in May for opening sentences; .7 in February and .7 in May for closing sentences).

(b) The child can be definitely taught to increase the number of connectives. (2.0 in February and 3.5 in May).

(c) He can be urged to use many more colorful words or phrases (2.0 in February and 3.2 in May).

(d) The number of new words he uses (vocabulary building) may be increased slightly in the formal talk (1.5-1.7).

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STUDENT TEACHING

Sixty-seven school systems of the state of New Jersey have coöperated during the past year with the New Jersey College for Women, New Brunswick, in providing organized student teaching in elementary and secondary school subjects for those electing the teacher-training course at the college. (Note: Of a student body of 1031, there were 378 students—sophomores, juniors, and seniors—enrolled in the teacher-training course. One hundred fifteen seniors completed student teaching this past year.)

The attitude of school officials and teachers participating in this work has been most gratifying. In every case students have been ushered into the profession of teaching in a most helpful and sympathetic manner.

Feeling that there is much to be learned from the practice of other teacher-training institutions, the writer sent, on February 19, 1929, a short questionnaire to 194 colleges and universities. One hundred thirty-one replies (approximately 67 percent) were received.

RETURN ACCORDING TO GEOGRAPHIC DISTRIBUTION

Alabama	1	Nebraska	2
Arizona	1	Nevada	1
Arkansas	1	New Hampshire	2
California	5	New Mexico	1
Colorado	2	New York	12
Connecticut	1	North Carolina	2
Delaware	1	North Dakota	1
Florida	2	Ohio	15
Georgia	1	Oklahoma	2
Idaho	1	Oregon	1
Illinois	4	Pennsylvania	16
Indiana	3	Rhode Island	1
Iowa	2	South Carolina	1
Kansas	3	South Dakota	1
Kentucky	2	Tennessee	2
Louisiana	2	Texas	3
Maine	3	Utah	1
Maryland	3	Vermont	2
Massachusetts	7	Virginia	5
Michigan	1	Washington	2
Minnesota	1	West Virginia	3
Mississippi	1	Wisconsin	3
Missouri	2	Wyoming	1
Montana	1	Total	131

OF THESE COLLEGES AND UNIVERSITIES

105 provide organized student teaching in the academic subjects of the secondary school curriculum;

1—Southern College, Kansas, provides student teaching for teachers of music only;

2—Iowa State College and Cornell University, for home economics only;

1—Bethany College, Kansas, for music and home economics only;

2—Massachusetts Agricultural College and Rhode Island College, for vocational subjects only;

1—Whittier College, California, for elementary teachers only;

3—Teachers College, Columbia; Greensboro College, North Carolina, and Greenville Women's College, South Carolina, provide observation only;

2—Colgate University, New York, and University of Chattanooga, Tenn., provide only observation and substitute teaching in local schools;

1—Hobart College, New York, provides only for teaching of two lessons in college classes;

1—Skidmore College, New York, provides observation only for secondary school teachers in local schools and teaching in college classes; have student teaching for teachers of elementary and special subjects;

12—Colleges provide no student teaching experience. These are:

Yale School of Education, Connecticut; Illinois Wesleyan University; Iowa Wesleyan College (expects soon to provide student teaching); Bates College, Maine, (education courses broadly cultural); Wellesley College, Massachusetts; University of Mississippi (hopes soon to have student teaching); Adelphi College, New York (graduates usually become "Teachers in Training" in New York City schools); Western College for Women, Ohio, (trying to arrange for practice work); Bryn Mawr College, Pennsylvania; Randolph-Macon Woman's College, Virginia; University of Richmond, Virginia; and Washington and Lee University, Virginia.

QUESTIONNAIRE

Question I. What is the length of your student teaching period?

1 year	5 institutions		270 hours	1 institutions	
1 semester	46	"	125 hours	1	"
4 months	1	"	more than 90 hours	3	"
3 months	7	"	70–80 hours	2	"
10 weeks	2	"	50 hours	3	"
9 weeks	3	"	40 hours	2	"
6 weeks	1	"	less than 30 hours	5	"
5 credit hours	1	"	(misunderstood question or did not answer it	22	")

Question II. How do you provide for student teaching?

Practice school (university high school usually on campus)	12	institutions
Local (city or town) public schools	45	"
Local schools, both public *and* private	4	"
Practice school *and* local schools	16	"
Nearby schools	7	"
(Boston University uses schools in 50 nearby towns)		
Local *and* nearby schools	19	"
Practice school *and* local *and* nearby schools	2	"

Question III. When is the work done—during what year of the college course?

Post-graduate year 7 institutions (in 4, during senior year for elementary school teachers)

First post-graduate year or senior year	1	"	
Senior year	87	"	
Senior or junior year	4	"	
Part senior, part junior	1	"	(University of Wisconsin)
Junior year	1	"	
Second year	1	"	(Mansfield Female College, La.)
Fourth, third, or second	1	"	(depending upon whether junior or senior high-school teaching)
Second or first year	1	"	(Logan College, Kentucky)
Last three years of six-year course	1	"	(Antioch College, Ohio)

Question III (Continued). When is student teaching done—after what professional courses in education have been completed?

Educational Psychology	45	institutions	(in 2, during sophomore year)
Elementary or General Psychology	27	"	
Principles of Education	26	"	(in 1, alternative with History, in 1, with Methods)
General Methods	23	"	(in 3, concurrent with student teaching; in 1, alternative with Principles)
Specific Methods	18	"	(in 3, concurrent with student teaching)
History of Education	18	"	(in 1, alternative with Principles)
Introduction to Teaching	17	"	
Principles of Teaching	9	"	(in 1, concurrent with student teaching)
Observation of Teaching	8	"	
Introduction to High-School Teaching	4	"	
Technique of Teaching	4	"	(in 1, may be concurrent with student teaching)
School Administration	3	"	
Secondary Education	3	"	
School Management	3	"	
Educational Measurements	2	"	
Educational Sociology	2	"	
Elementary Education	2	"	
Introductory Course in Education	2	"	
Philosophy of Education	2	"	
Problems in Secondary Education	2	"	
The High School	1	"	
High-School Organization	1	"	
Child Psychology	1	"	
Principles of Philosophy	1	"	

Science of Education	1	"
Survey of Education	1	"
Teaching Process	1	"
"Courses vary"	1	"
"Fifteen hrs. of professional credit"	1	"
Junior standing only prerequisite	1	"
"All education courses precede or accompany practice teaching"	1	"
"One professional course of 6-12 hours."	1	"
"*Before* any courses in Education"	1	"
With Methods and Educational Psychology concurrent with practice-teaching	1	"
"No sequence of courses"	1	"
"Eighteen semester hours"	1	"
"Most of professional courses"	1	"
"All courses in Education but Administration"	1	"

Question IV. What is the ratio between the amount of student teaching and observation of teaching?

Student Teaching	Observation	
100%		1 institution
95	5	1 institution
90	10	5 institutions
85	15	6 institutions
80	20	6 institutions
75	25	4 institutions
70	30	2 institutions
65	35	4 institutions
60	40	11 institutions
50	50	25 institutions
40	60	3 institutions
35	65	9 institutions
25	75	3 institutions
20	80	8 institutions
5	95	1 institution
"Mostly observation"		1 institution
"Varies according to need of individual"		8 institutions
No stated division of time		8 institutions
"Mostly student teaching"		3 institutions
(Did not answer question		2 institutions)

Question V and *Question VI.* Is the student absent from college classes during the time she is engaged in student teaching? Does she miss academic work that must be made up at the termination of the student teaching

period and, if so, what is the attitude of the faculty members of other departments in regard to this?

Student is not absent from college classes	89 institutions	
Student is absent from classes and misses work that must be made up	7 institutions	(in 1, is usually absent only from classes in Education)
Student is occasionally absent from classes	4 institutions	
Student is only rarely absent from classes	5 institutions	(in 1, may substitute student teaching for other work in Education)

The attitude of the college faculty in regard to student teaching is mentioned only by the heads of departments of education in those colleges where student teaching involves absence from college classes. In most instances it is described as "coöperative with a few exceptions."

Question VII. What proportion of the students in your department are engaged in student teaching at one time?

All students	8 institutions	1/6 of students	4 institutions
2/3 of students	2 institutions	1/7 of students	3 institutions
1/2 of students	17 institutions	1/10 of students	6 institutions
2/5 of students	3 institutions	1/12 of students	1 institution
1/3 of students	11 institutions	1/15 of students	2 institutions
1/4 of students	14 institutions	1/25 of students	1 institution
1/5 of students	9 institutions	(did not answer the question	24 institutions)

Question VIII. How is the student teacher's work supervised?

By—

Head of the department of education	1 institution
College director of student teaching	4 institutions
Members of department of education	10 institutions
Critic teacher	13 institutions
Department director of student teaching *and* critic teacher	16 institutions
Principal of school *and* critic teacher	4 institutions
Members of college department *and* critic teacher	23 institutions
City subject supervisor or head of school department *and* critic teacher	5 institutions
Director of student teaching *and* superintendent or principal of city schools	3 institutions
Member of department, superintendent or principal of school, *and* critic teacher	14 institutions
Member of department, city subject matter supervisor, *and* critic teacher	2 institutions
Member of department, college specialist in subject matter, *and* critic teacher	1 institution
Supervisor of each high-school department in practice school	3 institutions

Supervisor of each high-school department in practice school *and* critic teacher — 2 institutions
Supervisor of each high-school department in practice school *and* member of college department — 1 institution
(did not answer the question — 3 institutions)

Question IX. What percentage of the students enrolled in your institution take the teacher-training course?

Less than 1%	1 institution (Smith College)	61%—70%	5 institutions
		71%—80%	7 institutions
Less than 5%	6 institutions	81%—95%	3 institutions (1, a School of Education)
5%—10%	11 institutions		
11%—20%	16 institutions	100%	10 institutions (Schools of Education)
21%—30%	6 institutions	"Percentage varies"	1 institution
31%—40%	9 institutions	"Large percentage"	1 institution
41%—50%	14 institutions	"Very small percentage"	1 institution
51%—60%	7 institutions	(Did not answer	7 institutions)

Question X. Will you please mention other features in your system of providing student teaching experience?

Arrangements for student teaching:

At the Pennsylvania College for Women, and at Texas Woman's College, students schedule their academic program for the forenoon, leaving the afternoon free for student teaching.

At Bethany College, West Virginia, the student has usually completed her work in her major subject at the time that she begins student teaching.

At St. Louis University, Missouri, a lighter schedule of academic studies for the senior year is arranged for students who will engage in student teaching.

At Pennsylvania State College, student teachers in squads of 25 go to nearby cities for 9 weeks of full-time teaching; for the other 9 weeks of the semester they do intensive work in education. (They are enrolled in no other department.)

Oberlin College's department of education takes over 9 classes in the local high school and supplies teachers for these. The pupils choose the subjects to be taught—subjects that ordinarily would not be given—and thus there is no complaint from parents.

At Oklahoma City University, the student teacher shifts from one grade or level to another every 9 weeks.

New York University student teachers are licensed by the city board of education and are appointed to non-salaried positions.

At Syracuse University, limited facilities make student teaching possible for only about one-third of the seniors in the department of education.

The University of Arizona hopes to subsidize the assistant superintendent of the city schools and have him place the student teachers.

Academic credit given student teaching:

At Goucher College, Maryland, and at Logan College, Kentucky, student teaching is given no academic credit.

At St. Louis University, Missouri, the amount of credit given student teaching is flexible, varying from 3 to 5 semester hours—according to the quality of the student's teaching and the time spent on immediate preparation for the work.

At a number of colleges and universities, courses in Methods of Teaching include a number of hours of observation, no additional credit being granted.

Eligibility for student teaching:

At Texas Woman's College, students' grades are considered before student teaching is permitted.

Trinity University, in the same state, recommends for the permanent certificate only those who are above the average in scholarship.

At Bethany College, West Virginia, an average of at least "C" in all academic work is required before student teaching is permitted.

At Western Reserve University, Ohio, no one is allowed to receive a teaching certificate who does not have grades of "G" or above in 50 per cent of academic work. Each prospective teacher must also pass a physical examination; voice and use of English must be satisfactory, and major and minor subjects must be suitable to high-school teaching.

The State University of New Mexico "discourages those who appear to be poor teachers."

At Ohio Wesleyan University students are given a subject matter examination previous to student teaching.

The University of Texas limits enrollment in the student teaching course to those students who have the required grade in all college work.

Critic Teachers:

In Indiana the state department of education passes upon the qualifications of critic teachers.

Elmira College, New York, reports that the work of the critic teacher is voluntary and receives no remuneration.

Texas Woman's College does not pay the critic teachers, nor does Wilson College, Pennsylvania, which "endeavors to make the presence of the student teacher an asset."

At Alleghany College, Pennsylvania, each student pays a laboratory fee of fifteen dollars which is given to the local board of education and so to the critic teacher.

For each student teacher from Lebanon College, Pennsylvania, the principal of the school is paid five dollars, the critic teacher twelve and one-half dollars.

Muhlenberg College, Pennsylvania, gives the critic teacher a fee of ten dollars for each student teacher.

The University of Tennessee pays the critic teacher twenty-five dollars per student teacher.

At the University of New Hampshire some of the student teachers receive remuneration for their work when they take the place of regular teachers.

Supervision of student teaching:

The difficulty of securing effective supervision of student teaching is mentioned by several colleges and universities.

In several institutions, weekly conferences between the college director of student teaching and the critic teacher are a part of the supervision of the student's teaching.

In a number of colleges the student teacher meets with a member of the department of education once a week

during the period of her observation and student teaching.

One college schedules for each student teacher three hours of classroom work each week with the instructor who directs her student teaching.

Current literature on student teaching in these institutions:

Beloit College, Wisconsin, for a description of its student teaching procedure refers to a "forthcoming article in *Educational Administration and Supervision.*"

Temple University's summer student teaching experiment is written up in the May issue of the *School Review.*

Florida State College for Women uses the plan of student teaching developed by Dr. Harry Miller in the Wisconsin high school. This is described in the *18th Yearbook of the National Society for the Study of Education.*

Attitude of college faculty toward student teaching:

At Western Reserve University, Ohio, and at a number of other colleges, the faculty of departments other than education object that so much time and energy is devoted to student teaching in the senior year "at the expense of 'really cultural' subjects."

At Colby College, Maine—a traditional liberal arts college—the faculty are opposed to absence from classes due to conflict between the student teaching program and other college work.

Miscellaneous facts regarding student teaching:

Several institutions offer two separate teacher-training courses—a four-year course for prospective high-school teachers and a two-year course for elementary school teachers.

An Ohio college provides, in the junior and senior years, for observation of teaching in groups followed by critiques conducted by members of the department of education.

A number of colleges write that student teaching in their institution is in an experimental stage; several of those that do not now offer student teaching hope to be able to do so in the near future.

ZORA KLAIN

New Jersey College for Women

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